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Argentine Shows and Live Stock (1904).

British Breeds of Live Stock (1910). Issued by the Board of Agriculture and Fisheries.

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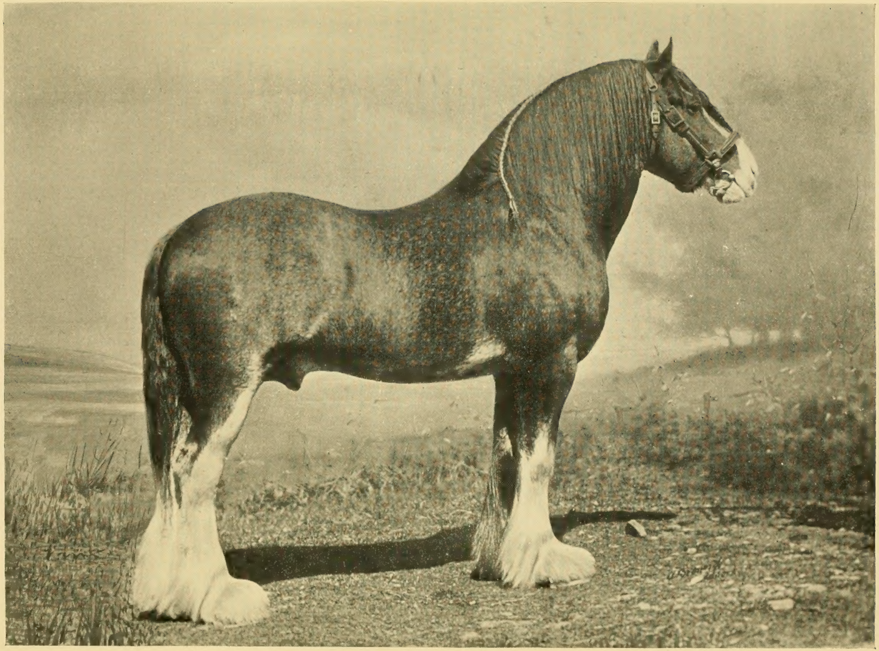

Noted Clydesdale Sire, "Dunure Footprint."

Frontispiece.

FARM LIVE STOCK OF GREAT BRITAIN

BY

ROBERT WALLACE, M.A.

PROFESSOR (EMERITUS) OF AGRICULTURE AND RURAL ECONOMY IN THE
UNIVERSITY OF EDINBURGH

ASSISTED BY HIS SUCCESSOR

J. A. SCOTT WATSON, M.C., B.Sc.

FIFTH EDITION—REVISED AND ENLARGED

WITH 442 PLATES, AND 111 FIGURES IN THE TEXT

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DEDICATED

TO THE

LIVE STOCK BREEDERS OF THE UNITED KINGDOM

IN WHOSE INTERESTS CHIEFLY THE WORK HAS
BEEN REWRITTEN

12327

PREFACE TO FIFTH EDITION

THE Procœmium to *Systema Agriculturæ* (J. Worlidge), 1681, says:—"This is an Age wherein to commend or extol an Ingenious Art or Science might be esteemed a Needless Labour, especially in a Country so highly improved in everything; but that we find the more Noble, Advantagious, Useful, or Necessary, any Art, Science, or Profession is, the stronger Arguments are framed against it; and more particularly against the Rustick Art and its infinite Preheminences and Oblectations, by the vainer and more pedant sort of persons despising the worth or value of what they are ignorant of, who judge it below their honour or reputation to take any notice of so mean a profession; that esteem the Country no other than a place for Beasts as Cities for men."

History repeats itself, and after the lapse of well-nigh two hundred and fifty years we find the same spirit of antipathy to Agriculture so quaintly described by Worlidge. It is a misfortune, though perhaps more for humanity than for Agriculture, that men who have received a liberal education, in the ordinary acceptation of the term, in science, literature, and philosophy, so frequently when referring to Agriculture assume the rôle of "the vainer and more pedant sort of persons despising the worth or value of what they are ignorant of." By some it is denied that Agriculture is an art, although of all arts it is undeniably the oldest and the most widely distributed, as well as the most important, the most indispensable, the most healthful, the most interesting, and the most elevating. With another school of philosophers it is not a science, though it may fittingly be described as a great co-operative association of applied sciences. Agriculture can afford to smile at such pedantry, and excuse it on the plea of ignorance. She has also the consolation of knowing that, in spite of the modern philosopher's ingratitude to, and want of appreciation of, Agriculture (in which he contrasts unfavourably with his prototype of Egypt, Carthage, or Rome), yet not a day passes without repeated acknowledgment in deed, if not in word, of his absolute dependence upon her for his very existence; an undeniable proof that in this respect, in spite of all his assumed airs of superiority, the pedantic philosopher is in no superior position to the most humble toiler in the farmyard or in the field.

If Agricultural literature has hitherto failed to secure the attention of some of those "wise" men who despise Agriculture, but who, by going to the country, themselves show that they do not quite "esteem it no other than a place for beasts," it is to be hoped that the pictures presented in this volume may stimulate the Nature Study Movement, and especially the interest in the rural work of man, and, above all, in the actions and dispositions of the animals which are constantly displayed before them. Such "wise" men would then be able to enjoy during a change to the country, relaxation and resuscitation of mind, as well as attain the meaner and less elevating object of the restoration of the physical constitution.

The Fourth Edition of this work has been out of print for over four years, and owing to the untoward circumstances resulting from the war the preparation of this New Edition has been delayed. One consequence has been the exceptional number of additions made in the Appendices to bring important subjects up to date.

The modern history of many of the breeds of British Live Stock is evolving at a rapid rate, and the growing demand for good cattle has greatly extended and stimulated the general interest. The influence of the foreign buyer, who insists upon a registered pedigree with each animal, has been so beneficial that hardly a breed of any outstanding importance now exists in the country that does not possess a Breed Society, which, among other chartered duties registered under the Limited Liability Companies Act, annually issues a Report. Special thanks are due to the Secretaries of these Breed Societies for their valuable assistance in providing copies of the historical notices of the breeds in their Society publications, and furnishing recent information relating to them. But, while fully acknowledging indebtedness for willing help, I assume the entire responsibility for what has been stated generally as well as in relation to individual breeds, as I have had to keep in view not only the interests of one special breed, but also its connection with other breeds, and the position that it occupies in the great Live Stock economy of the country. The histories of the various breeds have been carefully examined, and references have been made to the sources of information, so that readers who desire to study any breed in detail may be assisted in doing so.

The home- or first-aid of farm animals has been exhaustively dealt with. The list of common diseases has been greatly extended, and each disease has been fully though briefly described, and the remedies to be used stated. For this work thanks are due to Wm. R. Davis, M.R.C.V.S., Enfield.

I have endeavoured in the text or by footnotes to indicate my indebtedness to previous writers, but it is necessary to make mention of the following works which have been of more than usual value, and to which the reader may be referred for information of a more detailed character than is possible to give in a general work:—Youatt's various works on Live Stock; Low's *Domesticated Animals of the British Isles* (1845); J. A. Thomson's *Heredity;* Morgan's *The Physical Basis of Heredity;* East and Jones's *In-breeding and Out-breeding;* Armsby's *The Nutrition of Farm Animals;* Henry and Morrison's *Feeds and Feeding;* Craig's *Judging Live Stock;* Plumb's *Types and Breeds of Farm Animals;* Warfield's *Cattle Breeding;* Sanders's *Shorthorn Cattle;* Sinclair's *History of Shorthorn Cattle;* MacDonald and Sinclair's *History of Aberdeen-Angus Cattle*, and *History of Hereford Cattle;* Eckles's *Dairy Cattle and Milk Production;* Hayes's *Points of the Horse;* Ridgway's *Origin and Influence of the Thoroughbred Horse;* Wortley Axe's *The Horse: Its Treatment in Health and Disease.*

To relieve the general pressure of my work, I found it expedient to obtain the co-operation of my highly qualified colleague, Professor James A. Scott Watson, M.C., B.Sc., my former assistant and now my successor in the Chair of Agriculture and Rural Economy in the University of Edinburgh. Professor Watson has the entire credit of recasting and amplifying Chapters I., III., IV., XIV., XXI., and XXXII., dealing respectively with "The Principles of Breeding," "Shorthorn Cattle," "House-feeding of Cattle," "The Clydesdale Horse," and "Feeding of Sheep." He has also contributed a new Chapter (XXXVI.) on "Wool," which is an important addition to the subject matter. A comprehensive and instructive Chapter (XXXVII.) on "Goats" has been added from the pen of H. S. Holmes-Pegler, the late Hon. Secretary of the British Goat Society, and a valuable Chapter (XXVI.), especially for students, on "Shoeing: The Foot, its Injuries and Diseases," by W. R. Davis.

I specially acknowledge indebtedness to *The Agricultural Gazette* for putting at my disposal its unique series of photographs of Agricultural Live Stock. The brand, "Agricultural Gazette Photograph" reproduced in each case, is a guarantee that the animal appears as it was taken. "Faked" photographs are of little value, and hitherto I have been occasionally restricted in my choice of subjects when nothing better was obtainable; it is best for all concerned to have a photograph retaken when it fails to give satisfaction.

Useful and highly appreciated assistance has been rendered by the loan of blocks from the following list of helpers: The Society of Antiquaries of Scotland; The Highland and Agricultural Society; The Cambridge University Press; *Modern Farming; Dumfries and Galloway Standard;* the late Henry J. Elwes, F.R.S., and Dr James Ritchie, D.Sc., F.R.S.E.

To Alfred Heneage Cocks, M.A., F.S.A., F.Z.S., whose name frequently appears in the text in connection with very special and valuable contributions; and to those friends, too numerous to mention, who have assisted me in reading the proofs, I have pleasure in recording grateful thanks.

ROBERT WALLACE.

EDINBURGH, *February* 1923.

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FARM LIVE STOCK OF GREAT BRITAIN

INTRODUCTION

A PROPER **knowledge of the habits** and requirements of the **animals** of the farm is, without doubt, the most important branch of a farmer's education. It is the one, too, that is found to offer the greatest difficulties to men who take to the profession of farming late in life. In fact, few men who have not, as boys, been intimately associated with animals can ever hope to attain the first rank as judges or managers of stock. For the same reason we never find a really first-rate shepherd in a hill district—the place where superior knowledge and intelligence are most wanted—who has not as a boy seen, and assisted in, all the many little details of the management of a flock. He drinks in the information, as it were, with his mother's milk, and does not realise in after-life that he was not born with much of the knowledge he possesses. Nor is it only a knowledge of animals, but also an interest in them, that a boy gains by associating with them. They are the playthings of his youth, and the objects of his affection as he grows in years. A first-rate judge and prize-winner—it does not matter in what class of stock—is invariably found to spend much of his time gloating over the points of his favourite beasts. It is only in this way, and not from books, that a man can ever master the details of structure and the peculiarities of breed and constitution, and obtain that knowledge which alone can lead to financial success as a breeder, and victory in the show-ring.

A servant entrusted with the management of stock must make his charge his hobby if he is to be successful in his vocation. A man is quite as happy in the enjoyment of one hobby as of another, provided it be of his own choice; and it is much better for himself, for the sake of his own comfort as well as of the permanency of his employment and the amount of his remuneration, if the hobby be that by which he wins his daily bread. One of the weak points in the **British system of education**, so far as agricultural labourers and the small working-farmer classes are concerned, is that no adequate provision is made for their learning in their youth (the time when all the deepest and most lasting impressions are formed) the business they intend to follow. Agriculture—particularly as concerns the **live-stock branch**—is not like an ordinary trade or profession, which admits of hard and fast rules being laid down, and of being learnt in so many years, even after a man reaches maturity. Its principles, whether they be acquired by the farmer or by the labourer, have to be taken in little by little, through a long period of time, which must embrace a considerable proportion of his boyish days. The knowledge must come, as it were, instinctively: it cannot be learnt by rote. It would indeed be wrong to deny the obligation to give every working man in the kingdom a good plain education; for, putting aside all considerations of sentiment towards our fellow-men, and the necessity of having every one educated who is to have a voice in the government of the country, there is an undoubted advantage in having work performed by the aid of that intelligence which accompanies education. But what calls loudly for protest is the virtual prohibition of the learning by boys, at the only time when they can do so perfectly, of the one branch of business by which they themselves will live and may in time rear families. The present system is much too one-sided. It is the extreme into which we have fallen, after a long period of deficiency in the department that now receives too much attention. Youth is entirely spent upon book-learning; interest and inclinations which must develop are led into channels far away from the employments of adult life; work, when it has to be done, is performed as a drudgery and with a heavy heart; the frame is not trained, while it is being built up by Nature, to dexterity and efficiency, nor yet is it strengthened and enlarged by that practice which always precedes efficiency.

Why should not our educational system provide for the training of our labouring classes in both its branches, manual and mental, when this would conduce so much to their future happiness and the public good? In saying this, it is fully realised that the only possible places where a sound practical training, such as schoolboys should have, can be acquired, are ordinary farms managed on commercial principles. Every facility ought to be given by school authorities to boys to avail themselves of the opportunity of taking part in the regular work of busy seasons, under conditions which provide work of a natural and useful kind, of which they are able to recognise the practical value.[1]

---

[1] The above views, expressed before 1893, were elaborated in the Author's *Open Letter to the Rt. Hon. D. Lloyd George on the English and Scottish Education Bills* issued in 1917, and reprinted as the *Opening Lecture* to the Class of Agriculture and Rural Economy in Edinburgh University in October 1919-1920.—Oliver & Boyd, Tweeddale Court, Edinburgh.

CHAPTER I

THE PRINCIPLES OF BREEDING

Theories of Heredity—Darwin's Pangenesis, Weismann's Continuity of the Germ-plasm—Biparental Inheritance—Prepotency—Modern Theory Stated—Mendel's Law — Curious and Interesting Cases — Recent Advances by American Workers—Present State of Knowledge of Heredity — Books to Read — Live Stock Improvement by Mass Selection—Ordinary Pedigree Breeding—Genotypic Selection—Blood Relationships—Intensive In-Breeding—Line Breeding.

THE **family resemblance** which is observable among related individuals, whether animals or plants, is perhaps the most obvious phenomenon in connection with breeding, and illustrates what is commonly accepted as the **first law of heredity**, viz., that "like begets like." **Other laws**, however, operate at the same time, and it is a fact, more or less obvious according to circumstances, that no two individuals, however nearly related, are ever exact doubles. To the uneducated eye every member of a flock of Southdown ewes or of a herd of Angus cattle looks exactly like its neighbour; and the townsman marvels when he is told that some shepherds know individually every member of their flocks, perhaps of several hundreds. Not only so, but the animals themselves recognise each other individually, by eyesight as well as by smell.

The **broad facts of heredity** then, on which the art of the breeder is based, are these:—On the average, an individual resembles its immediate relatives more than it does any other member of its race; but there is an ever-present tendency to variation, which makes this resemblance always incomplete. The breeder's art consists in an endeavour to turn these facts to his own advantage, and so to produce types of animals and plants which possess a maximum value. The tendency to variation gives him individuals of more than average value, and such alone he selects for breeding. Next he may endeavour to combine, in one individual, such valuable qualities as he finds separately in two or more. And finally he endeavours, by various means, to fix, or perpetuate from generation to generation, the combination of good qualities that he has built up. Effort in these directions is as old as the civilisation of Egypt, and the Arab horse is a striking example of its success.

Various **theories of heredity** have been proposed by philosophers and savants from time to time. To account for the general likeness of related individuals, and having done so, to explain the exceptions, is the aim of all such theories. Darwin's hypothesis, that of *Pangenesis*, was the first modern attempt to arrive at an explanation of the facts. His theory was to the effect that each of the minute cells which make up the body of an animal or plant gave off buds or gemmules, each of which constituted a sample, as it were, of the cell in question. These gemmules were carried off by the blood, to be collected and reassembled in the reproductive organs; each reproductive cell came to contain a full set, and was thus a sort of representative sample of the whole body. One obvious difficulty about such a theory is the tremendous complexity of the process which it assumes. Many millions of gemmules must be supposed to be gathered together into each germ cell, and the whole process must be assumed to occur many millions of times over in the same animal. Moreover, the theory would imply the inheritance, in an equal degree, of all kinds of characters, inborn and acquired, whereas we know that the latter are very rarely inherited, if at all. For example, dishorned cows do not produce naturally polled progeny, nor do docked horses give us short-tailed foals, as the pangenesis theory would lead us to expect. Darwin himself regarded his theory as provisional only, and since his time it has been universally rejected.

The basis of the most generally accepted theory of heredity was laid by **Weismann**, and the fundamental idea is that of *continuity of the germ-plasm.* When the individual begins to develop from the egg, the majority of the cells formed acquire special structure and special functions — those, for example, of bone, skin, or muscle. But it is assumed that a portion of the original unspecialised living substance of the egg is set aside at the very outset, a sample as it were of the original stuff from which the animal is made. This substance, the germ-plasm, which carries the hereditary qualities of the race, is maintained in its original condition throughout the life of the animal and part of it is handed on to each successive generation. The germ-plasm, kept in the reproductive organs, is nourished and guarded by the body; but, so long as it is nourished in a normal way, it remains unaffected by local and accidental modifications of the body, due to outside causes. There is thus no need to assume any complex process such as the pangenesis theory supposed. The characters represented in the germ-plasm are not derived from the body. They will in general correspond with those which find visible expression in the body, because the body and the germ-cells are alike derived from portions of the same original egg. But the essential point is that the characters that an animal is capable of transmitting—its hereditary qualities—are determined at the very beginning of its life, and remain unaffected by subsequent conditions, no matter how much the latter may influence the actual and visible characters. This, the main practical consequence of the germ-plasm theory, is in accordance with observed facts. Mutilations are not inherited. The results of nutrition and training, of environmental conditions generally, are not passed on. Certain conditions of life are of course necessary for the full and normal development of the inborn characters, but variations in these conditions leave no impression on the permanent qualities of the race. Numerous **proofs** of the general soundness of **Weismann's theory** could be cited. For example, the experiment has been performed by **Castle and Phillips**[1] of removing the ovaries of a white guinea-pig and grafting in those of a black. The white female bred, and continued to breed, exactly as if she had been black, showing that the actual body colour of the parent was not the thing which was transmitted, but the colour represented in the germ-cells.

It must be admitted that the position just set forth is not unanimously subscribed to by **biologists. A minority** still **hold** that modifications of the body, due to use or disuse of parts and so forth, may be, and sometimes are, transmitted in some slight degree. But those who so contend have never yet succeeded in bringing forward definite or conclusive proof of their belief, and the number of their adherents is certainly diminishing. Practical breeders, while they frequently hold some belief in the inheritance of the effects of training, feeding, etc., seem rarely to base any of their actual operations on such belief. In assessing the value of a particular animal for breeding, it is usually found that they try to make allowance for anything abnormal in its nurture, and endeavour to form a judgment of what the animal would have been under normal conditions. Moreover, actual results seem to show that methods of breeding which are in accord with Weismann's theory, are quite sound. For example, many of our best work horses are bred from generations of ancestors which have never been in draft, and in which, if the effects of disuse be inherited, the ability to pull a load should have progressively diminished. Certain dogs—pointers, setters, retrievers, and especially collies—do not fully conform to the general rule.

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[1] W. E. Castle and John C. Phillips, "On Germinal Transplantation in Vertebrates," Carnegie Institute of Washington, Publication 144, 1911.

Already our **theory of heredity explains much.** "Like begets like" because a definite substance, the germ-plasm, is handed on from parent to offspring, and determines by its constitution the characters that appear in successive generations. But not all the characters of the father are inherited by the son, because some of the characters of each are, by their very nature, not heritable at all. A **sharp distinction** is drawn between "**inborn**" and "**acquired**" **characters**: the former are "in the blood," as we say, and are heritable; the latter, due to outside causes acting on the body, are confined in their effect to the individual and have no significance for future generations. It is perhaps necessary to say that the distinction between what is "born" and what "made" may often be difficult or even impossible in practice. But in theory the distinction is essential.

It will be obvious, however, that much still remains to be explained. How is it, for instance, that full brothers may differ enormously, as they often do, not only in their visible characters but in breeding ability—that is to say in inborn qualities—as well? Without doubt it arises, in the main, from the complications involved in the fact that in all the higher animals two parents are concerned in the heredity of each individual. It is this fact which makes animal breeding so much more complicated and difficult in practice than plant breeding. Most plants can be, and many are regularly, self-fertilised, so that their "pedigree" consists of a single line of ancestors. With **biparental inheritance**, on the other hand, the number of ancestors doubles in each generation as one works backwards through the pedigree. It has long been an obvious fact that an animal produced in this way could not conceivably possess all the characters of all its ancestors, but it is only recently that the actual process of inheritance in such cases has come to be understood.

The old conception of biparental inheritance was that the commonest result was a sort of intimate blending of the characteristics of sire and dam; and that when differing qualities had been so blended in an individual, they tended to be handed on by that individual in the blended condition. Exceptions were indeed known to occur, and many cases had been observed where, say, a paternal characteristic appeared in the offspring to the complete exclusion of the corresponding maternal character. This was expressed by saying that the one parent was more *prepotent* than the other, with regard to the character in question, and many rules have been stated from time to time which professed to explain this phenomenon of prepotency. Thus old-established breeds were supposed to be more prepotent than others of recent origin, and the **male** was considered to be generally prepotent with regard to certain groups of characters, the **female** with regard to others. There is indeed a considerable basis of truth underlying some of these old rules, but none of them get at the root of the matter.

Apart however from this question of prepotency, the animal was regarded, in the main, as a blend of the parental types, and was supposed, in the main, to reproduce this blended condition in its progeny. But since the beginning of this century our point of view has completely changed. Ample evidence has been obtained that the mechanism of heredity is something fundamentally different from this supposed process of continuous blending. The essentials of the **modern theory** can be briefly **stated**. The germ-plasm of each male or female reproductive cell contains one complete set, neither more nor less, of "determinants," bodies of fixed and definite constitution which are the representatives, in the germ-plasm, of the bodily characters. Hence we must suppose that when the male and female cells unite, to form the fertilised egg, this fertilised egg will contain a double set of "determinants." The individual is not in any true sense a blend; neither is it a mosaic, with a paternal character here and a maternal there. It has, on the other hand, a kind of double individuality, each character being the product of two separate determinants, which may be like or unlike and which are derived one from each of its parents. What finds visible expression in the body may be the paternal or the maternal character, or a form intermediate between the two. But in the germ-cells the two determinants remain together as separate and complete entities. Moreover, when the animal breeds it hands on, to each of its progeny, not a mixture of the two determinants, and not both, but either one or the other. In fact, half the progeny get one member of the pair, and half the other. Thus if a sperm-cell contain the determinants *A*, *B*, and *C*, and an egg-cell the alternative determinants *a*, *b*, and *c*, the individual formed by the union of the two would have the constitution *Aa*, *Bb*, *Cc*. The latter would hand on to its progeny *A* to one-half, *a* to the other, *B* to one-half, *b* to the other, *C* to one-half, *c* to the other. Ordinarily each pair of determinants would behave without reference to the others, so that many new combinations would occur among the reproductive cells of the individual in question —*ABC*, *aBc*, *AbC*, and so on. But the point is that the individual determinants that come out of an animal in breeding are the same that went in when it was bred.

The broad theory of **biparental inheritance** which has just been outlined has many important bearings. Before dealing with these, however, it will be well to consider very briefly those simpler cases of heredity where only one parent is involved. Such cases are common among the lower animals and among plants—the ordinary cereals, such as barley and oats, furnishing well-known examples. In these, cross fertilisation is so rare that the majority of plants in an ordinary crop will have only a single line of ancestors, stretching back for many generations. If we raise a family of oats from a single self-fertilised plant of such ancestry, we get what is called a "**pure line.**" The peculiarity of such a family is that all the plants constituting it have exactly the same hereditary qualities. They show different individual characters of course, due to variation in the supply of food substances, light, air, and so forth, but when allowed to reproduce, each one gives the same type of progeny as the others. Neither by selection nor by any other known method can we change this type at will. It is fixed and constant, and can only be broken down by crossing, or by the rare occurrence of a "sport." The discovery of this fact alone has given us quite a different conception of heredity from that held by Darwin and the older biologists. **Darwin** imagined the characters of a race as in a continual state of flux, with a high degree of variability, the variations being more or less hereditary. For this conception we can now substitute a perfectly clear and definite idea. Within a "pure line," like begets like in a certain real sense with perfect strictness, in that each member of a family breeds absolutely true to the family type. The special characteristics of the individual, on the other hand, are all of the nature of modifications due to outside causes, and are not inherited at all. It follows that the hereditary material—the germ-plasm—of a particular race has a fixed and definite constitution.

The condition, a "pure line," does not, of course, occur in any of our types of live stock, because the two parents probably always differ in their hereditary characters. If they belong to different breeds, the differences will probably be many and large; but even within one breed, or one family of a breed—even between closely related individuals, hereditary differences will exist. The law which is generally believed to govern the inheritance of such differences was discovered in 1865 by the Austrian monk **Gregor Mendel**, and is accordingly known as **Mendel's law**. It was not till 1900 that the importance of Mendel's work came to be appreciated, and it is scarcely too much to say that the whole of our modern theory of heredity has been built up since the latter date. A description of a **simple case of Mendelian inheritance** will best serve to explain the principles of Mendelism. The essential feature of Mendel's method of investigation, which brought out a clear and simple rule where others had found nothing but confusion, was that he considered each unit difference by itself, whereas other hybridists had taken as their units whole individuals possessing numbers of distinctive characters. We must therefore consider the case of a single pair of differing characters, such for example as the colours of Andalusian fowls. Andalusians are of three colours—black, white with black splashes, and "blue," which last is actually a diffused and less intense black pigmentation. Black individuals mated together breed true for colour, as also do the splashed whites. The black crossed with the white produces all blue chicks. The two opposing factors, both struggling as it were for expression, together produce the intermediate blue condition. But the two colours are not, and in fact cannot be, permanently blended, for the blues do not breed true. What happens is that a blue cock, for example, produces two kinds of sperm-cells in equal numbers, one-half bearing the black determinant and the other half the factor for splashed white. The blue hen produces the same two types of eggs, in equal proportions. Thus, the two opposing factors which were put into the cross-bred animal, separate out again in the formation of the reproductive cells. The latter cannot carry the hybrid condition, but only one or other of the pure states. This, the purity of the germ-cells with regard to the factors which they contain, is the essence of Mendel's discovery.

In the light of the foregoing, it is possible logically to account for the results of any possible colour mating. Suppose, for example, we mate a black cock with blue hens. The male in question breeds true for colour, and produces only "black" reproductive cells. The females, on the other hand, produce "black" and "white" egg-cells in equal proportions. If a "black" sperm happens to fertilise a "black" egg-cell, the result will be black offspring; if it happens to meet an egg-cell containing the factor for white, the result will be a blue chick; and as, obviously, the chances of either mating are equal, we should expect black and blue chicks in about equal proportions, which is what actually occurs. Similarly blue mated with white produces blues and whites in equal proportions.

In the mating together of blues, both parents produce equal numbers of reproductive cells bearing the black and white factors respectively. The chances are, therefore, that the following four combinations will occur in equal proportions:—

"Black" sperm and "black" egg . . .	black chick
"Black" sperm and "white" egg . . .	blue chick
"White" sperm and "black" egg . . .	blue chick
"White" sperm and "white" egg . . .	splashed white chick

We should therefore expect 25 per cent. blacks, 50 per cent. blues, and 25 per cent. splashed white, which again is the result actually obtained. The whole series of matings may be represented diagrammatically as follows, the large circles representing the birds themselves and the small circles the reproductive cells produced by them:—

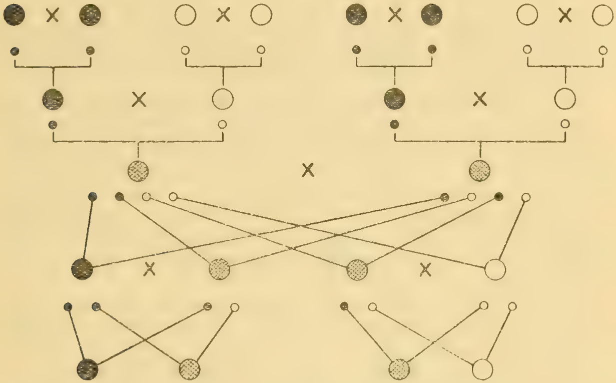

FIG. I.—MENDELIAN INHERITANCE IN ANDALUSIAN FOWLS.

The larger circles represent individuals; the smaller, the reproductive cells produced by them.

It is to be noted that the actual numbers of each of the different types obtained in any actual experiment are subject to chance variations, and that it is only when tolerably large numbers are involved that close approximations to the expected ratios can be obtained.

It is necessary to bear in mind that the results described above apply only to a single pair of characters considered by themselves. When several pairs of alternative characters are involved each pair normally behaves without reference to the others, and new combinations of characters, which were not present in either of the parents, turn up in the second cross. It is one of the commonest misconceptions about Mendelism to regard it as applying to type as a whole—to expect, for example, that **half-bred sheep** mated together would produce Border Leicesters, Cheviots, and half-breds in the same proportions as apply to the simple Mendelian case. If two or more pairs of characters are considered together, the case becomes progressively more and more complicated. Thus, for example, if we cross a round, deep-eyed **potato** with a kidney-shaped, shallow-eyed sort, we get an oval, medium-eyed type as the first cross. In the next generation, if the first cross is allowed to self-fertilise, we do indeed get the ordinary ratios :—1 Round : 2 Oval : 1 Kidney, and 1 Deep-eyed : 2 Medium ; 1 Shallow, but the two pairs of characters separate out without reference to each other, giving the combined ratio of :—

1 Round—deep-eyed	2 Round—medium-eyed	1 Round—shallow-eyed
2 Oval—deep-eyed	4 Oval—medium-eyed	2 Oval—shallow-eyed
1 Kidney—deep-eyed	2 Kidney—medium-eyed	1 Kidney—shallow-eyed

Thus there are nine different types in the second cross, and the original combinations found in the parents occur each only once out of sixteen. Were we to consider three pairs of characters simultaneously, the parent type would occur only once in sixty-four of the second cross, and so on. Thus, if only ten pairs of Mendelian characters are involved in the Cheviot-Leicester cross (and it is possible there are far more), we should expect a pure Cheviot from half-bred parents only once in 1,048,576 times.

It is obvious that even where ordinary Mendelian inheritance obtains, actual breeding experiments may become very involved owing to this multiplicity of factors, and it appears that in practical stock-breeding problems there is nearly always a large number of factors to be considered. The claims of the enthusiasts of the early days, that the knowledge of Mendel's principles would reduce the whole art of breeding to a simple and straightforward business, or at most to a matter of accurate book-keeping, seem unlikely to be realised. Moreover, **several sorts of complications** have to be reckoned with, some of which may be briefly alluded to.

In the case of the Andalusian fowl, described above, the two pure-breeding types are easily distinguishable, not only from each other but from the hybrid or cross-bred form. This is not always so. If, for example, we cross a rose-combed with a single-combed breed of fowl, the chickens are not intermediate, but "take after" the rose-combed parent entirely ; or if we cross a red with a black breed of cattle, the crosses are not intermediate, but black. This phenomenon was found by Mendel in all the experiments which he carried out and was by him termed *dominance.* Those characters which found expression in the first cross Mendel called **dominant**, those others which were apparently obliterated in the first cross were termed **recessive.** Complete dominance was at first regarded as a regular feature of Mendelian inheritance, but it has since been found to be perhaps the exception rather than the rule. Dominance has no great significance in theory ; the hybrid form, when we have complete dominance, is to all appearances like one of its parents, but it produces, just as in the previous case, two kinds of germ-cells in equal numbers, bearing the dominant and recessive characters respectively. **The ratio** in the second cross is apparently three dominants to one recessive, but two of the dominants are really hybrids like the first cross, so that the actual ratio is one pure dominant: two hybrids: one pure recessive (1 *D*: 2 *DR*: 1 *R*) again, as in the case previously described. In practice, dominance sometimes causes difficulties, as when it is desired to eliminate a recessive character. In **Angus cattle**, for example, black is dominant to red (see p. 168). The red colour can be handed down in a latent condition through generations of blacks, and has not yet been completely eliminated, in spite of the fact that very few reds have been retained for breeding. It is only when two black animals are mated, both of which are impure in the matter of colour (*DR*) that there is a chance of one in four of the calf being red. The obvious method of getting rid of the tendency to throw red would be to discard not only the red calves, but both their parents, in every case. But of course this would frequently entail the sacrifice of valuable animals, and would rarely be considered worth while.

Among the many cases of Mendelian inheritance that have been investigated there exist all shades and degrees of dominance, from those where the hybrid is indistinguishable from one of the pure parent types, to those others where it is, as nearly as can be determined, exactly intermediate. Not only so, but there is clear evidence that the degree of dominance may vary, from reasons that are not understood, as between the same pair of characters. It does so, for instance, with regard to those characters of the potato described above. Or to take an example from **our live stock**, this irregular dominance occurs with regard to colour in Shorthorn cattle (see p. 71). In these, colour inheritance is, in the main, along the same lines as in the Andalusian fowl. Whites mated among themselves breed true to colour: so also do the reds: while roan is the intermediate hybrid condition, giving, in matings of roan and roan, 25 per cent. reds, 50 per cent. roans, and 25 per cent. whites. But dominance is very variable. Not only does the roan range from a very close approach to red on the one hand, to what is practically white on the other, but it has been demonstrated beyond doubt that dominance of one or other colour is sometimes complete. Hence some few animals, that are hybrid for colour, and breed as though they were roans (which they should be according to theory), are actually red or white as the case may be.

A further interesting case in connection with dominance occurs in **sheep.** If a hornless breed is crossed with one that is horned in both sexes, the first cross males are horned, while the females are hornless. If these cross-breds are interbred, the second cross consists of males, three-quarters of which bear horns, while the other quarter are hornless, and females, three-fourths of which are hornless and one-fourth horned. The fact is of course that the horned condition is dominant in the male, recessive in the female. Horn development in the hybrid male ceases on castration, and is modified in pure horned breeds.

Many other **curious and interesting cases** have been found where sex is connected with other characters. For example, if a pure-breeding Barred Rock cock is mated to black hens, the chickens are all barred like the male parent. But if a black cock is mated to a barred hen, the male chicks are barred while the females are black, the colours of the sexes being thus reversed in the progeny. Such cases as this have received a complete and satisfactory explanation, to give which, however, would take us too far into Mendelian theory.

Another difficulty in the practical application of Mendelism is that individual factors or determinants do not always produce separate individual visible characters. In sweet peas, for instance, it has been shown that two separate factors are necessary for the development of flower colour, either of which alone produces no visible effect. Hence it is possible to get purple-flowered plants from crosses of two whites, the whites each possessing one and lacking the other of the two colour factors. Again, two factors, each of which alone produces a certain visible effect, may produce quite a different character when they are present together. Thus, as already stated, there is a factor for rose comb in poultry, which is dominant to single comb. So also there is a factor, dominant to single, for the "pea" comb which is found in the Indian Game. When, however, the rose and pea factors are present in the same fowl, the comb is neither rose nor pea, but "walnut," like that of the Malay breed. This case is quite different from that of an intermediate hybrid, for it is due to the simultaneous presence of two separately heritable dominant factors, and can therefore be fixed to breed true.

Again, it may be said generally that where separate Mendelian factors have only small visible effects, and where these effects are liable to be obscured by non-hereditary fluctuations, Mendelian analysis must necessarily be an extremely slow and laborious business.

A **very important advance** in our knowledge of heredity has been made since the first decade of this century by **Professor T. H. Morgan** and his pupils in America, working mainly with a single species of insect, a small fruit-fly (*Drosophila*). Not only has the inheritance of almost every known character, to the number of over a hundred, been fully investigated, but a most valuable addition has been made to Mendelian theory. It was stated above that, generally speaking, each pair of factors behaves without reference to other factor-pairs in the same cross, but it has been known for some time that there were some very marked exceptions to this rule. An extreme case, for instance, was discovered in sweet peas. In the latter, the erect condition of the standard petal is dominant to the hooded condition and the normal ratio of 3 erect : 1 hooded is obtained in the second cross. In an actual experiment, out of 2712 second cross plants bred, there were 2046 erect, 666 hooded, against an expectation of 2034 and 678. Similarly, purple flower-colour is dominant to red, and in the same 2712 second crosses the numbers obtained were 2048 purple, 664 red, which again are very near to expectation. In this experiment where a purple erect type was crossed with a red hooded we should normally obtain the following combined ratio in the second cross:—

Nine-sixteenths purple erect, three-sixteenths purple hooded, three-sixteenths red erect, one-sixteenth red hooded—giving, out of 2712 plants, the following numbers: 1526 purple erect, 508 purple hooded, 508 red erect, 170 red hooded.

Instead of this ratio there were obtained: 2036 purple erect, 12 purple hooded, 10 red erect, 654 red hooded. Obviously the two pairs of factors do not sort themselves out independently of each other. Instead, in this particular case, the factors for erect standard and purple colour keep together in rather more than 99 cases out of 100. But it is not that there is any peculiar attraction between the factors for purple and erect standard as such, for if we start off with the opposite combinations of characters, quite a different ratio is obtained. As a matter of fact, using purple hooded and red erect parents—which of course give the same type of first cross, viz., purple erect—the following numbers were obtained out of 5789 second cross plants: 2969 purple erect, 1379 purple hooded, 1441 red erect, and no red hooded. This again is a close approach to what we should have expected with only one pair of factors. It is the same sort of ratio as is obtained in the second cross from Andalusians, viz., one-quarter like each of the original parents, and half like the first cross (1 *D* : 2 *DR* : 1 *R*). The point common to both of the above experiments is that the two characters tend very markedly to reappear, in the second generation, in the same combinations as those in which they occurred in the original parents.

This phenomenon, the tendency for separate factors to remain in their original combinations rather than to distribute themselves at random, is termed *linkage*. Linkage relationships have been very fully investigated in the fruit-fly, and have thrown new light on the mechanism of heredity. In the insect in question there are four groups of characters, with linkage relationships among all the members of each group, but with no such relationship between members of different groups. Between any two particular factors in a group the degree of linkage may be great or small, but it is constant, and can be expressed in a definite figure.

These facts have been found to fit in, in a remarkably complete manner, with another set of facts relating to the minute structure of the germ-plasm. In the reproductive cells of the fruit-fly there are four pieces of obviously specialised living substance, which can be seen under the microscope and which are known as *chromosomes*. Each chromosome has a characteristic size and shape, which it preserves throughout successive generations. The fertilised egg, formed by the union of the male and female reproductive cells, has eight chromosomes, or more strictly four pairs, a member of each pair being derived from either parent. The theory is then that each chromosome contains one of the groups of linked factors, the fertilised egg containing of course a double set. In the formation of the reproductive cells the number of chromosomes is again reduced to four. The parental chromosomes do not indeed preserve their original identity, for if they did, we should have complete linkage between all the members of a group; neither, however, do they break up into separate individual factors, to be re-assembled into completely new chromosomes, for in that case we should have no linkage at all. What happens apparently is that each chromosome breaks up into perhaps two or three pieces, while the other member of its pair divides at corresponding points. These pieces of chromosome material are then exchanged and re-assembled to form new complete chromosomes, which are handed on as the hereditary material of the next generation. If two factors are situated close together in the same chromosome, the chances of a break between them will be small, and the degree of linkage will be high, as in the case of those characters of the sweet pea dealt with above. If factors are in the same chromosome, but wide apart, the linkage will be slight, while if two factors are in different chromosomes, linkage will not occur. The fact that the degree of linkage between factors is constant shows that the factors are arranged in the chromosomes according to a definite plan, which plan, in the case of the fruit-fly (but so far in it alone) has been accurately drawn to scale. It may be mentioned that the number of chromosomes is usually much greater than in the fruit-fly. Thus in wheat there are eight pairs, in the horse nineteen, and in man twenty-four. It is to be expected that the number of groups of linked characters in these various species will correspond to the number of chromosome pairs, or, in other words, the number of independently heritable characters will not prove to be greater, in any species, than the number of chromosome pairs.

A further interesting fact about the fruit-fly is that in the female each chromosome has its actual pair, while in the male there are three pairs of like and one pair of unlike members. Of the latter, one is straight and the other L-shaped. In the formation of eggs by the female each egg-cell receives a like set of four, but of the sperms formed by the male, half get the straight chromosome while the others get the bent one. If an egg is fertilised by one of the first it gives rise to a female, while if it meets one of the latter group it will form a male. Sex is therefore determined at the moment of fertilisation and in the same manner, broadly speaking, as other characters. The ordinary sex ratio of 50 per cent. male to 50 per cent. female is analogous to that obtained by mating together, say, a blue and a black Andalusian, the two parental types being produced in equal numbers among the offspring.

Such then, briefly and broadly, is **the present state of knowledge** of the principles of heredity.[1] The main problem has been solved. The Mendelian theory of the separation of unit characters in the formation of the reproductive cells, and also the more recent chromosome theory, have both survived every test that has been devised and applied up to the present, and it can be said with confidence that we have at last reached a real understanding of the fundamental facts. A knowledge of general principles gives us, however, very little of immediate practical value. Before we can arrive at results that will be helpful to the breeder of live stock, the heredity of each type of farm animal must be separately investigated, and such investigation, if indeed it is possible, must necessarily be an exceedingly slow and laborious business. It has taken a group of brilliant men some ten years to unravel the hereditary characters of a small fly, which probably offers an exceptionally simple problem as these things go, and which can be bred rapidly and in thousands at the cost of a few rotten bananas. It will not then be soon that we shall have gathered together the corresponding data with regard to the much slower-breeding domesticated animals, which can, at the best, be bred for experimental purposes in relatively small numbers. Up to the present, if we confine ourselves to the animal kingdom, it is possible to point to but one solitary example of the useful application of Mendelian analysis to a quality of real and considerable commercial utility. This is the case of egg production in fowls worked out by Dr Pearl on Plymouth Rocks, at Maine Experimental Station, U.S.A., Hurst in this country, and others, who have been able to make many valuable suggestions to the practical breeder aiming at improved egg yields. There is, of course, good hope that other things of economic importance, such as milk production or the qualities of wool, will ultimately yield to Mendelian analysis, but investigation of these matters has but recently started, and it may be long before results are obtained. Still more remote, perhaps, is the prospect of reducing the qualities of, say, draught-horses or beef-cattle to any Mendelian scheme, since these qualities are at once more complex and much less readily measurable. Meanwhile, the practical breeder must rest content with such few general lessons as can be drawn from the discoveries of the scientific worker, who, in turn, must work in close contact with the practical and useful side of the subject.

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[1] It is obviously impossible within the limits of a short chapter to give any complete or thorough treatment of this somewhat difficult subject. Readers seeking such are referred to Punnett's *Mendelism* (MacMillan) (5th Edn., 1919); J. Arthur Thomson's *Heredity* (Murray), or Babcock and Clausen's *Genetics in Relation to Agriculture* (M'Craw-Hill Book Co.) (1918).

The work of the animal breeder ought never to consist merely in the multiplication of a type. Even for ordinary commercial purposes, animals reserved for breeding should be chosen with care, and with a view to the maximum profit from their use. Obviously, before any attempt can be made at such a choice, it is essential that the breeder should have a clear conception of the type he wants. His most important equipment will always be a thorough knowledge of his breed, and, built up in his own mind, a clear and sane ideal type.

The **earliest method devised** for the improvement of our live stock was what is called simple or **mass selection**—"breed the best to the best"—the test of value being solely that of individual merit. This system is generally so far successful, but it has obvious and serious imperfections. The objection to it is that the visible characters of an animal often provide us with an incomplete or even misleading picture of the hereditary qualities represented in its germ-plasm. Some of the bodily characters are of the nature of modifications or fluctuations; that is to say, have causes other than heredity, and so are without significance for the breeder. Again we know that latent, or what Mendel called recessive characters—to which we have no visible clue—may be represented in the germ-plasm, and afterwards appear in the progeny. This is the commonest explanation of a trait "**skipping a generation,**" as we say. Lastly, it may be that what we regard as a good quality is due to a hybrid condition of the germ-plasm, in which case we get the seeming paradox of a character that is due to heredity and yet is not, as such, capable of being transmitted. For instance, if we want blue Andalusians or blue-grey cattle (p. 177), or roan Shorthorns, the way to produce them is not to breed from two animals of the desired type—which would be mass selection and would give us 50 per cent. of failures—but to cross the two pure breeding types. It is possible that many of the qualities for which we are at present breeding are due to some such hybrid condition of the germ-plasm, and hence can never be satisfactorily dealt with by the process of mass selection. Of the failure of mass selection a striking example was obtained in Pearl's work with Plymouth Rocks mentioned above. In spite of careful trap nesting and systematic breeding from the heaviest layers over a series of years, no improvement was made in the average laying record of the strain. The reason apparently was that individual egg records are in a high degree subject to chance variations which are not hereditary. But it is unnecessary to labour this point of the inadequacy of mass selection. Any breeder can call to mind numbers of animals that have been outstanding as individuals and utter failures at stud.

The **next step** in the development of breeding methods is recourse to what we may call **ordinary pedigree breeding**, that is to say, selection on the combined basis of the merit of the individual and the average merit of its ancestors. Due weight must of course be allotted to each of the ancestors, the rough rule being that the characters of a parent are twice as important as those of a grand-parent, and so forth. The method of **evaluating pedigree** that obtains in certain breeds, according to which special significance is attached to **descent in the female line** from a particular and perhaps very remote ancestress, is certainly irrational, although at times successful. The advantage of pedigree methods is that they enable us, in some measure, to distinguish between heritable and non-heritable qualities. If, for instance, we have a deep-milking cow whose female ancestors have been heavy milkers, the probability is that the desirable quality will again be transmitted. On the other hand, if her ancestresses have been poor, the chances are much against her being a consistent breeder of deep-milking stock. But such a statement requires reservation. If we get a red Angus calf, descended from generations of black ancestors, it would seem natural to suppose that it would "throw back" to the ancestral colour; but we know that on the contrary it would breed true to red, if bred to a red mate. Hence we are never justified in assuming that a character which turns up in an apparently haphazard manner is therefore incapable of being transmitted in a perfectly regular manner.

There is a **third system** of selection, which is at once sounder in theory and more successful in practice than either of the other two. This is what the biologist calls **genotypic selection,** and briefly it consists in breeding, not from the best, nor from the best bred animals, but from the best breeders. That is, we make test matings of say a particular sire, and rear a fair sample of the type of stock he is capable of getting, the use of the sire being meantime suspended until his progeny have developed sufficiently to be judged. If these are unsatisfactory, both progeny and sire are discarded; if good, then both are retained for breeding. It scarcely requires to be said that this method is a marked advance on the others. Obviously the milk records of half a dozen of a bull's heifers form a much surer guide to his breeding ability than do those of his dams. This system is, in fact, the best that can be devised, short of recourse to the methods of Mendelism, which is not to be recommended at present. In practice, of course, except with quick breeding animals like pigs and poultry, the method is applicable only to sires; but then "the sire is half the herd." There are other obvious practical difficulties; but it may often be worth while to face these, for the alternative system continually gives cause for dissatisfaction. A cattle breeder, for instance, works on the system of using a young bull for two seasons and then disposing of him. If the bull breeds well, he has been lost far too soon; if badly, then he has been far too extensively used.

There is one further question of outstanding importance to the animal breeder, the **question of blood relationships.** Robert Bakewell, the great master of the art of stock breeding, discovered that in-breeding—the mating together of closely related individuals—was a valuable aid to the process of selection, its effect being to reduce variability within the strain, or, as we say, to "fix type." This fact, which has been a matter of empirical knowledge for well over a century, has received a full and satisfactory explanation in terms of Mendelism. If we take a cross-bred plant, with perhaps a dozen characters in the hybrid condition, and permit it to self-fertilise, the progeny will be, with regard to any particular character, half hybrids and half pure, *i.e.*, one-quarter of each of the pure parental types. On the average, therefore, the second generation plants will contain half the original number of hybrid characters, and the number will continue to be reduced by half every time that self-fertilisation occurs. In six generations, a majority of the descendants of the original hybrid will have become pure with respect to all their characters—in other words, the mixed strain will have been largely resolved into its component "pure lines," which are definitely fixed and breed true. Self-fertilisation is, of course, by much the most intensive of the many forms of in-breeding, but the less intensive forms are not different in kind, and tend, only more slowly, to the same result.

The other side of the question, equally familiar to practical men, is that in farm animals, continued **intensive in-breeding** leads to **loss of vigour**, and more particularly to loss of **fertility**. Two alternative hypotheses have been proposed by biologists to account for this aspect of the matter. The one view is that the hybrid condition, as such, of certain factors, is essential to the full development of fertility and vigour. If this be so, if pure lines of our farm animals should prove to be worthless owing to lack of those important qualities, then we must forego the hope of ever arriving at definite and final fixity of type.

The **alternative hypothesis** is that normal development is dependent upon the presence of a somewhat complex group of dominant factors, the lack of any one being sufficient to cause loss of vigour, or perhaps infertility or death. There is a considerable body of evidence in support of this view; many factors of the type indicated having been discovered in the fruit-fly as well as in other animals and plants.[1] Supposing that a considerable number of factors is involved, intensive in-breeding would bring out one or other of the pure recessive characters in a vast majority of the strain, and these would show the well-known ill-effects. But a small minority would contain the full set of dominants, in the pure condition; would be fully vigorous, and would, moreover, constitute a fixed and true breeding strain, a "pure line." Such a result would constitute a tremendous advance in animal breeding. Obviously this question, whether in its theoretical or practical aspects, is a most difficult one. At present, and pending further investigation, the **only sane course** is to rely on past experience, to adopt such degree of relationships in mating as has given generally satisfactory results in the past history of one's breed. In some breeds, such as the **beef Shorthorn**, close in-breeding has proved remarkably successful. In several others broad breeding has produced a majority of the best individuals. In most breeds, however, some intermediate system —what is called **Line Breeding**—has given the best results. Here the breeder restricts his choice of material to animals of the same family or strain—he mates together individuals of the same general bloodlines, but not such as are immediately or closely related. The desirable result of in-breeding—fixity of type—can be equally well (only more slowly) obtained by this less drastic method. And if line breeding is accompanied, as it should be, by systematic and rigorous selection, then the proportion of misfits and weaklings will be far less than what would be obtained under a system of intensive in-breeding. Nevertheless, the fact is, that the more closely in-bred a particular animal is, provided it is a good animal with constitution, the more valuable will it prove as a breeder, for it will tend to breed true.

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[1] For a full discussion of this question see *In-breeding and Out-breeding*, by East and Jones (Lippincott).

CHAPTER II

WILD WHITE CATTLE

Aboriginal Cattle of Great Britain—*Urus* or *Bos primigenius*—*Bos longifrons*—Relationship of *Urus* to Wild Park Cattle—Authorities quoted: Storer, Harting, Low, Boyd Dawkins, McKenny Hughes, T. A. Smith, Robert Knox, Sir Chas. Lyell, and Rütimeyer—The Breeds at Chillingham Park, Hamilton or Cadzow Park, Chartley and Woburn Parks, Vaynol Park, and the Crosses in the Zoological Society's Gardens, London—Park Cattle Society's Herd-Book—The Dynevor, Faygate, Poynetts, Solva, and Wilcote Herds.

THE **Aboriginal Cattle**[1] **of Great Britain**, in common with those of the continent of Europe, belonged to a colossal form, the *Urus* of Cæsar, or, to use the more recent and more common name, the *Bos primigenius*, part-progenitor of our domestic cattle. It is generally accepted that the original colour of cattle was black or mouse-brown, or a combination of these, with or without a lighter shade forming a stripe along the back. Whatever may have been the origin of the white hair and skin, apparent in the park herds of "white cattle," the frequent appearance of black or dark red-brown calves in white herds many years after animals of dark colours had been shut out from breeding with them, probably indicates a connecting link between the more ancient dark and the modern white. The white of the "wild" cattle has no resemblance to that of an albino—dark points and dark eyes, which are nearly universal, being incompatible with albinism.

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[1] See *The Wild White Cattle of Great Britain*, by the Rev. John Storer (Cassell & Co. 1879); *British Animals Extinct within Historic Times, with some Account of British Wild White Cattle*, by James Edmund Harting (Trübner & Co., 1880); "A Visit to the Existing Herds of British White Wild Cattle," by Alfred Heneage Cocks, F.Z.S., the first published review of all the herds (*The Zoologist*, August 1878); *The Zoology of Ancient Europe*, by Prof. Alfred Newton (Cambridge, 1862); "Report of the Committee [of ten scientific men, A. H. Cocks, M.A., Editor] appointed by the British Association to report on the Herds of Wild White Cattle in Great Britain," reprinted in *The Zoologist*, November 1887; Culley's *Observations on Live Stock*; *Natural History of the Ox Tribe*, by George Vasey, 1857; a paper by H. E. Forrest in *The Naturalist*, Oct. 1908; *The Influence of Man on Animal Life in Scotland*, by James Ritchie, D.Sc. (Cambridge University Press, 1920).

Storer says:—

> "The universal colour was **white**, in general pure, approximating, however, in a few instances, to **cream-colour**, but with certain points otherwise coloured, and these points generally black. The tips of the horns, the muzzle, the circle round the eyes, the hoofs, were in all the herds black; in some the extremity of the tail (the switch or brush) was of the same colour; while the ears in all were either black or brownish-red inside, and wholly or partially of the same colour outside the ear also. In most of them the front part of the fetlock, particularly of the forelegs, was marked with black, and in all there were a few black hairs on the legs, a little above the hoof. In all of them, too, there was, I believe, a tendency more or less slight, to produce small black or bluish-black spots on the neck, and even sometimes on the body (producing a 'flea-bitten' appearance). All were subject to occasional variations. Individuals were born, though somewhat rarely, with more than the average amount of white on the horns, ears, above the eyes, on the muzzle and hoofs, or on some of these parts; and in some, black or black-and-white calves now and then appeared; but these last were always destroyed when young, in order to preserve the original characteristics of the herd."

The only recorded possible exception is that of the **herd at Leigh Court** in Somersetshire, near Bristol, which in 1806 "had become so wild that the owner was obliged to have them shot." They were said to be "fawn, tending to yellow; very red towards the flanks, horns tipped with black; hoofs black; inside of the ear red." The author of another account was equally persuaded that they were white, while Storer thought probably both accounts were correct, and that "the cattle dated back to monastic times, and varied from a white colour to a light dun—the variation being possibly produced by some cross," and if so, possibly with the red breed which originated the Devon cattle of the same neighbourhood.

In his pristine form the *Bos primigenius*, the wild bull of the primeval European forests, exceeded a height of six feet at the shoulder, as may be gathered from the enormous dimensions of a considerable number of prehistoric skulls and other remains dug up from time to time in various parts of the United Kingdom, but not in Ireland.

A collection of sixteen great skulls, not included in Harting's comprehensive list (1880), is now in the Harris Museum, Preston. It is a portion of an important find of remains (mostly antlers of red deer) made during the excavation of a dock near Preston (1884 to 1892). (See Fig. 2 and Fig. 3.)

Plate II. B also shows the sweep of the horns (which was round) and a part of the concave forehead of a characteristic Scottish specimen. The girth of the horn core close to the root is here $13\frac{7}{8}$ inches, while, with hardly an exception, the specimens of Pleistocene Age in the British Museum and elsewhere

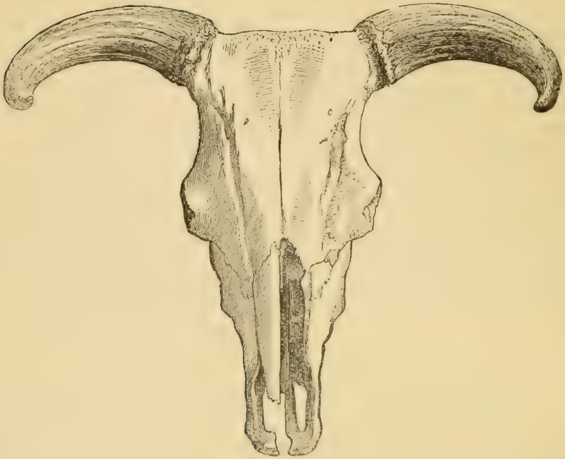

FIG. 2.—FRONT VIEW OF SKULL OF "URUS."
From Fifeshire; one-seventh natural size.[1]

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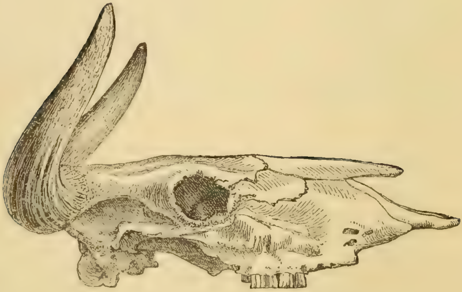

FIG. 3.—SIDE VIEW OF ABOVE SKULL OF "URUS."
One-seventh natural size.[1]

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[1] Indebtedness due to Dr James Ritchie's *Animal Life of Scotland*, 1920.

have a girth of 17 to 18 inches. Subsequently to that period the species had degenerated and decreased in size, having taken a step nearer the more modern progenitors of the wild white cattle. (See Appendix D.)

The earliest known form of Domestic Cattle, misleadingly called the "Celtic Shorthorn," *Bos longifrons*,[1] was introduced early in the Neolithic Period. In almost every characteristic, except that of the length of horn, it differed from the modern so-called Shorthorn. According to Lyddeker the name should be *Bos sondaicus*, var. *domesticus*.[2] It possessed a small and slender form, and hair of a dark colour. It is the only domesticated bovine animal of which traces have been found in Britain, belonging to the period before the date of the Roman invasion, when Cæsar reported the "number of cattle great." Its descendants are now to be seen, after crossing to a greater or less extent with the *Bos primigenius*, in the smaller British and Irish breeds, for example, the Shetland and the Kerry. Its remains, numerous in Ireland, in the English fens, and other places, always indicate domestication.

Storer says of it :—

> "The forehead, somewhat flat, has a very prominent ridge standing up along the middle, and a smaller, indenting backwards ; the horns are much flattened and compressed, small, and directed outwardly upwards, and bent in one direction forwards. From the slender make of its bones, its body must rather have resembled that of a deer than our common tame ox ; its legs at the extremities are certainly shorter and also thinner than those of a *crown* deer (full-antlered stag). The skull is long and narrow, even more so than that of a deer. The rest of the skeleton is much like that of the tame ox, but each bone, in proportion to the length, more slender and thin."

Dr James Ritchie says :—

> "In Scotland the Celtic Shorthorn appeared in the Neolithic Period shortly after the first settlement of man in North Britain, and this, together with the fact that its remains are most frequently found in deposits accumulated on the sites of human habitation, point to its presence as a domesticated animal which has followed in the train of the men of the Polished Stone Age from the regions of the south. . . . From the skeleton, Prof. Nilsson estimated that the Celtic Shorthorn was '5 ft. 4 in. long from the nape to the end of the rump-bone, the head about 1 ft. 4 in., so that the whole length must have been about 6 ft. 8 in.,' a long-bodied but light and agile ox, well fitted to protect itself by speed of limb from the many beasts of prey of the Scottish forests."

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[1] *Bos longifrons* is a misnomer. Owen acknowledges that the name was adopted in place of the simpler *Bos brachyceros*, the correct term, because someone had used the term *Brachyceros* for small-horned (not short-horned) species, found on some of the East Indian Islands.—*History of British Fossils, Mammals and Birds*, 1846, p. 509.

[2] These cattle were in this country about 7000 B.C., while according to Read, the Aryan invasion of Britain, probably the Goidels or Galls, took place about 400 B.C.—A. H. C.

"The hair was of dark red or brownish tint," as shown by the abundance of cow-hairs in "strange masses of 'bog butter' which stored in wooden kegs or wrapped in skin or birch bark, have been found often at considerable depths in peat mosses" in many northern counties and in the Islands of Skye and N. Yell.

A black race of semi-wild cattle, believed to belong to this ancient domesticated race, at one time existed in Cornwall.

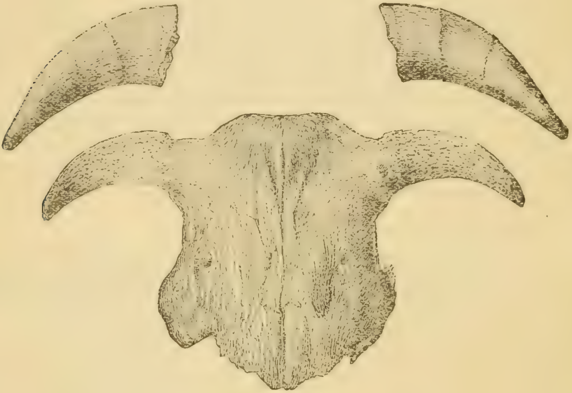

FIG. 4.—HORN SHEATHS OF ANCIENT SHORTHORN AND UPPER PART OF THE SKULL.

With horn-cores and with fragments of skin and hair attached, found deep in an Irish bog.

There is a strong presumption that the **ancient forest cattle**, the descendants of the *Urus*,[1] were the immediate progenitors of the wild park cattle of the present time, and also of the many herds which in comparatively recent years existed in various parts of the United Kingdom.

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[1] "The third kind of these (wild animals) is called the Urus. They are but little less than the elephant in bulk, but in appearance, colour, and shape resemble oxen (bulls). They are of great strength and speed, and spare neither man nor wild animals that they catch sight of. They are captured and slain in pits skilfully constructed. In this kind of hunting the young men inure themselves by exercise, and those who kill the greatest number of them publicly exhibit the horns as evidence, and carry off a great deal of *kudos;* but even when caught quite little they cannot become accustomed to man and tamed. In expansion, bulk, and appearance the horns differ greatly from those of our oxen. These carefully selected, are mounted round the lips with silver and used instead of cups in their most extensive feasts."—Cæsar, *De Bello Gallico*, Lib. vi., Cap. xxviii.

The herd at Burton Constable in Yorkshire, which Bewick records to have been extinct a few years before 1790, were much larger than the Chillingham cattle, "many of them weighing 60 stones." And the extinct **cattle of Lyme Park**, Cheshire, were reported to be

> "larger than any breed of cattle now existing in the country; higher on the legs, more upstanding, and longer in the body—very large cattle, with strong bones, much substance, and a large amount of flesh about the neck and dewlap. They had abundance of long, rough hair, which in the male was very fully developed, curly and mane-like on the head and fore-quarters ; and the hide was of immense thickness. They were very grand and symmetrical in appearance, and their movements were distinguished by a peculiar majestic stateliness."

This description gives a very credible picture of what might very well be the direct descendant of the gigantic wild bull of Cæsar's time, and of the monstrous bovine wonders of the Palæolithic and Neolithic Periods, when, as we have ample evidence to show, *Urus* was contemporary with man, though not as a domestic animal.

What seems to be, from internal evidence, a most reliable notice of the appearance and character of the great Caledonian forest bull, Ossian's "spotless bull," is Hector Boece's description, published in 1527, which in Bellenden's translation runs thus :—

> "This wod of Calidon ran fra Striveling (Stirling) throw Menteith and Stratherne to Atholl and Lochquhabir as Ptoleme writtis in his first table. In this wod wes some time quhit bullis, with crisp and curland mane, like fiers lionis ; and thoucht thay semit meik and tame in the remanent figure of thair bodyis, thay wer mair wild than ony uthir beistis, and had sic hatrent (hatred) aganis the societi and cumpany of men, that thay come nevir in the woddis na lesuris quhair they fand ony feit or haund thairof : and, mony dayis efter, they eit nocht of the herbis that wer twichit or handillitt be men. Thir bullis wer sa wild, that thay wer nevir tane (taken) but (without) slicht and crafty laubaur : and sa impacient, that, eftir thair taking, thay deit for importable (unbearable) dolours. Als sone as ony man invadit thir bullis, thay ruschit with so terrible preis on him, that thay dang him to the eird, takand na feir of houndis, scharp lancis, nor uthir maist penetrive wappinis."

Dalrymple's version of Bishop Leslie's account expands Boece's statement[1] :—

> "Neist this westwards lyes Monteith nobilitat[2] and meikle commendet throueh the name of sik cheise as nane fyner, quhairin by uthir singular

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[1] **Bishop John Leslie**, born 1526, ed. Aberdeen University ; died 1596, first wrote his History in Scottish, and presented the MS. to Queen Mary of Scotland, afterwards re-wrote it in Latin, and this Latin was translated by Father James Dalrymple in 1598. This version, half a century later than Boece, is published by Scottish Text Society, 1888-1895, see Vol. I., p. 28-30.

[2] Ennobled.

things that it hes ane famous suerie[1] and kinglie Castell, lykewyse ane certane monaster, of midway rentis it conteines. From thir cuntreyes that wyde and ample forrest called the Torwod hes the beginning; quhais boundis war sa large that frome the Callendar and Calder wod evin to Lochquhaber war extendet, in quhilke onlie, eftir the commoune speiking, war the quhyte Kye fund, of quhilkes now restes verie few, or nane: quhair in lyke maner war sa mony wylde bares (boars) that as the olde wryters make mentione, than being full, is now nocht ane: etc., etc.

"In this wod war nocht onlye Kye, bot oxne and Bules, snawquhyte with a mane thick and syde[2] quhilke thay beir lyke the mane of a lyone, thay mairouer war sa cruel and wylde that from mankynde they abhored in sik a sorte that quhateuir thing the handis of men had twechet or the air of thair mouthis had blawne upon or endet[3] as we speik, from al sik thay absteined mony days thaireftir.[4] Farther this oxx or Bull was sa baulde that nocht only in his yre or quhen he was provoked walde he cuircum horsemen bot evin feirit he nathing nathir tyred he, commounlie al men to invade bait with hornes ane feit ze[5] the dogis quhilkes with us ar maist violent, he regardet nocht bot walde clate[6] him with his cluifes[7] or kaithe[8] him on his hornes. His flesche was all girssillie but of a trim taist. He was aforetymes a frequent beist in this Torr Wod, but now consumed through the gluttunie of men only in thrie places is left in the Park of Striveling, the Wod of Cummirnside and of Kinkairne."[9]

From these quaint statements it is argued that few if any wild cattle remained, at least in the south of Scotland, into the sixteenth century.

The Forest of Torwood connected the Royal Forest of Stirling with the Cumbernauld Forest. Strangely, no mention is made of Hamilton, where alone the white cattle now survive in Scotland, which were there confined in a royal chase not in, but on the borders of, the Caledonian Forest.

As population increased and encroached upon the vast forests that covered the surface of the country, the numbers of wild cattle declined with those of wild beasts generally, and, to preserve them from extinction, the Crown, the great lords, and the monastic bodies **enclosed** and protected the decreasing remainder. The small numbers and the confinement within restricted areas subjected them to an undue amount of in-and-in breeding, and the large majority of the herds in question "have bred themselves out" and disappeared; while in those that remain, by diminished size, refined bone, and in some instances a tendency to barrenness, show that whatever the cattle may have gained by protective measures they have also suffered from close consanguineous breeding.

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[1] Strong.

[2] Low-hanging, or long; A.S. *sid* = long.

[3] Breathed upon.

[4] Chartley cows were reported by their keeper to desert their calves if these were handled immediately after being dropped.

[5] Yea.

[6] Rake or scratch.

[7] Clooves, or cloven feet.

[8] Or kythed = showed, or displayed, them.

[9] Suggested identification of localities by A. H. Cocks and Captain Steuart Gladstone:—

"M*o*nteith Castle" = Lake of M*e*nteith, River Teith, near Callander, South Perthshire.
"Torr Wood" = Torwood, Stirlingshire, near Larbert.
"Call*e*nd*a*r" = Call*a*nd*e*r.
"Calder Wood" = Calder House, Midlothian.
"Lochquhaber" = Lochaber.
"Striveling, Park of" = Stirling.
"Cummirnside" (= same; *not* Cumbernauld, as commonly quoted) in Dumbartonshire, North of Stirling.
"Kinkairne" (= same, and) Kincairney, Perthshire, near Dunkeld.

Leslie's account is chiefly "borrowed" from previous authors.

Storer has produced ample evidence to prove that the few herds that survive most probably owe their existence to the **introduction of fresh blood**, carried on systematically for many years, after they were confined, in conformity with the general belief of all high authorities on breeding before Bakewell's time, that in-breeding was wholly detrimental. At one time common cows were freely admitted to the wild bulls of both the Chillingham and the Chartley herds, and it is supposed to have been from the first crosses born of those animals that bulls were selected, as they generally possessed the colour and type of the wild sires. Some of the first cross females were excellent milkers.

Harting refers to twenty-two herds which are believed to have been enclosed—at various dates by royal assent or charters—from the herds of "wild beasts." **Storer** also gives a list of "localities where wild white cattle or their domesticated descendants are proved to have existed." Forty are named, including the enclosures.

The **Forest Laws** enacted by William the Conqueror (died 1087) were very severe, and the wild animals were safe from disturbance. The punishment for killing the big game which formed the objects of the "chase" was to "have both eyes torn out." When in 1225, under Henry III., many of the previous forest areas were removed from the protection of the forest laws, the wild game of all kinds became the prey of the country people, and liable to extinction within a few years. About this time the Chartley and, probably, other herds were shut into well-fenced parks to live in a state of nature. They were there free from outside interference, for heavy penalties, including three years' imprisonment, were incurred for trespass. The forests of Scotland and the north of England, especially in hilly regions, formed the last resorts of the wild cattle of the country; and we consequently find the **enclosed herds** most numerously represented in the northern regions. Five herds were thus secured in Scotland and five in the county of Durham, two in Lancashire, two in Cheshire, and one in each of the counties of Cumberland, Northumberland, Northampton, Nottingham, Staffordshire, Oxford, and Somerset. There is little doubt that all were drawn from one original common stock, although local characteristics may have crept in even before the animals were enclosed. They had one common feature, in being, so far as is known, white with dark points. Nearly all had black ears and muzzles, brown or red being the exception.

Extreme **in-and-in breeding** was the universal rule latterly, if not at first, and the disappearance of the majority of the herds may be mainly traced to the weakened constitutions thus produced, though at times some untoward circumstance tending suddenly to reduce the numbers also came into play. The herds at Auchencruive in Ayrshire, and Leigh Court, Somerset, were destroyed owing to the animals becoming dangerous or troublesome. Some were exterminated during political troubles, and others, like those of Drumlanrig and Blair Atholl, were removed to other places. Both these latter herds are represented in the still living remnants of the breed. The majority had horns which varied extremely in length, in form and in set, at least among those that are left or of which there are records. No less than **five original enclosed herds had, at least during some time, no horns**—those at Ardrossan and Cadzow in Scotland; Somerford Park, Cheshire; Wollaton Park, Nottingham, believed to have come from Whalley in Lancashire; and Gisbourne in Yorkshire. What remain of the progeny of the polled herds are all domesticated except Cadzow, and are cattle of good milking tendencies, but all have had other (domesticated) blood introduced.

No white wild **herd** was originally **enclosed in** any park in the **Principality of Wales**, but probably the **Welsh prototype** of the Scottish and English forest breed was **domesticated** instead, as it is recorded that "four hundred cows and a bull, all white with red ears," were sent from Brecknockshire to the court of King John as a peace offering. In consideration of the distance to be travelled, it is highly improbable that these were wild animals, impossible to control; and this conclusion is confirmed by the fact of the frequent appearance among Pembrokeshire cattle of white calves with black ears, bearing a very strong family likeness to the Chartley cattle. The Lamphey Court, S. Wales, herd (Plate VIII. A), dispersed in 1918, was developed from these reversions to an early type.

Low confirms the view above adopted, that the origin of the wild white cattle was the remnant of the *Urus* which lingered in the 400 miles of primeval forest covering the north of England and Scotland. He says:—

> "We have all the evidence which the question admits of, that no real distinction exists between the wild oxen of the parks and those which have for ages been subjected to domestication in the same country; and that these wild oxen are no other than the *uri* of the ancient forests of Europe."

Professor Sir Wm. Boyd Dawkins[1] takes another view, against which there is a vast amount of negative evidence. He states that the sole aboriginal race of domesticated British cattle was the small, slender, dark-coloured, short-horned animal, "*Longifrons*," which "came from Central Asia by gradual migrations as a domesticated race." And he declares that the large long-horned race was introduced at the time of the English invasion, and that its early wild prototype had become extinct here before the termination of the Bronze Age; consequently, the ancestors of the wild white cattle must have broken away from civilisation. In addition to the arguments which have been advanced against this view, it may be said that, had the wild cattle originated through animals escaping from domestication, they would certainly not all have become white in so many centres at such great distances apart; some of the numerous varieties of coloured cattle would surely have become established somewhere. That many coloured cattle escaped in an unfenced country and joined the wild herds in the woods before they were enclosed in parks is certain, but, weakened for "rustling" by domestication, no more of them would survive than would be easily absorbed by a great preponderating volume of wild blood. The occurrence (from time to time) in the semi-wild park herds of black, dun, blue, and sable specimens may be fully explained by the admixture of the blood of animals which escaped from domestication, if indeed they do not indicate what has been claimed repeatedly, that the original colour of the wild cattle was not white, but dark for protective purposes. Although it is almost inconceivable that protective colouring could be of any value to the powerful animals which dominated all rivals in their forest haunts, especially in view of the fact, gathered from observation of the habits of the Chillingham cattle, that the calves following their mothers join the main herd very soon after birth.

If the reduced size and osteological differences, on which Dawkins partially founds his opinion, were brought about on the continent of Europe as a result of evolution from the original gigantic ox, in the case of the cattle which he supposes to have been brought to this country and permitted to run wild, why could similar changes not have occurred here among the local representatives of the race? They were much more likely to alter in form and character than to become extinct under the conditions that prevailed, which, if Storer be correct, led through degeneration to diminished size.[1]

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[1] *Transactions of the North Staffordshire Field Club* for 1898-9, vol. xxxiii.

Professor T. M'Kenny Hughes[2] takes a similar view to that of Boyd Dawkins, also on negative rather than positive evidence. He says:—

> "There is no record of the *Urus* being found in Great Britain associated with Roman objects or any remains that would show that it lived on later, at any rate, than the Bronze Age." The earliest known form of domestic cattle—"a small ox about the size of a Kerry cow, with small horns sharply curved forward and a considerably elevated ridge between them, was the ox which the Romans found in Britain. Their middens are full of its bones."

It was most natural that the middens should contain the bones of the domesticated breed, but neither that fact nor the failure to find remains of the ancient wild cattle associated with traces of human existence so as to fix the period of their deposition can discredit the belief in the possibility of the existence of the wild cattle in the forest-clad mountain fastnesses of Scotland, which were never under Roman control.

Professor Hughes says of the skull of the *Urus*:—

> "The forehead is flat or slightly concave, and the horn-cores bend first out, then forward and downward, and finally the points approach one another with an upward curve. One measured 36 inches in length."

He holds that the Romans introduced a new breed which modified the small domesticated Shorthorn, and produced some at least of the ancestors of the domesticated breeds of later times; but the argument, based largely on the evidence of Roman coins and on the size (relative length) of the skull and the shape of the horn, is not conclusive to the practical breeder of cattle. As great differences in the length of the face and in the shape of the horn as those which he indicates, and on which he founds his argument, have occurred within the Ayrshire breed within the short space of the last century. The assertion that "in form, the Chillingham and the Highland cattle can hardly be distinguished," is so far from being correct that it alone is sufficient to shake the confidence of those who are unable of their own knowledge to judge of the more subtle and scientific part of the reasoning.

The suggestion Professor Hughes made in *The Times* of

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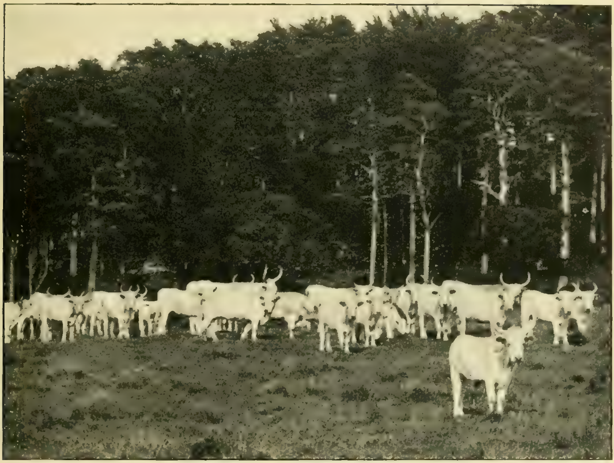
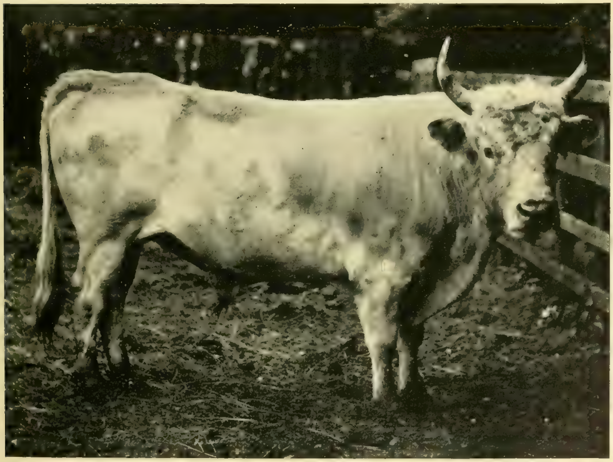
[1] Some light may be thrown on this debatable question by a find at Stone of the bones and skulls of the *Urus*, described by W. Wells Bladen (President) to the North Staffordshire Naturalists' Field Club, 20th Nov. 1895, and recorded in vol. xxx. of its *Transactions* (1895-6).

[2] In the *Proc. Soc. Ant.*, London, 14th June 1894, and in the *Journal of the Royal Agric. Soc. of England*, Sept. 1894.

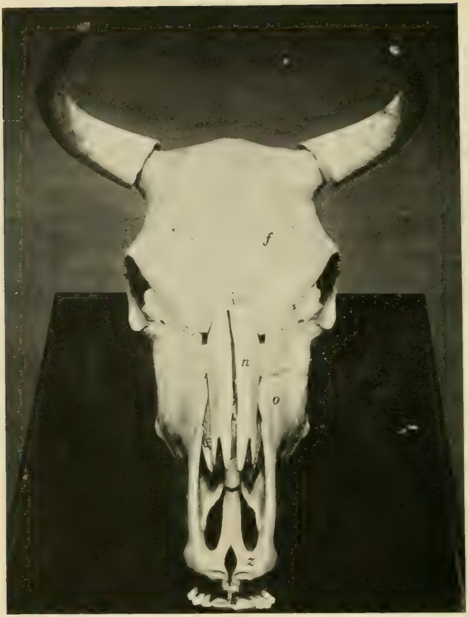


A. Wild White Cattle in Chillingham Park.

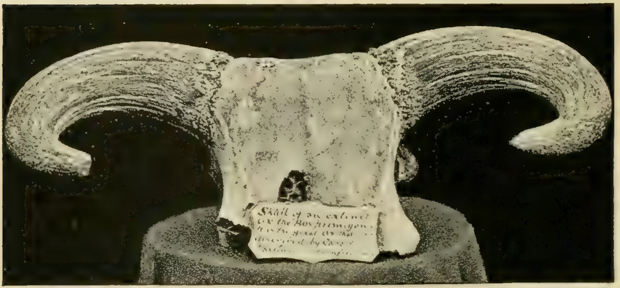


B. The Chillingham Bull put to Cadzow Park Cattle (p. 43).

[*C. Reid, Wishaw.*

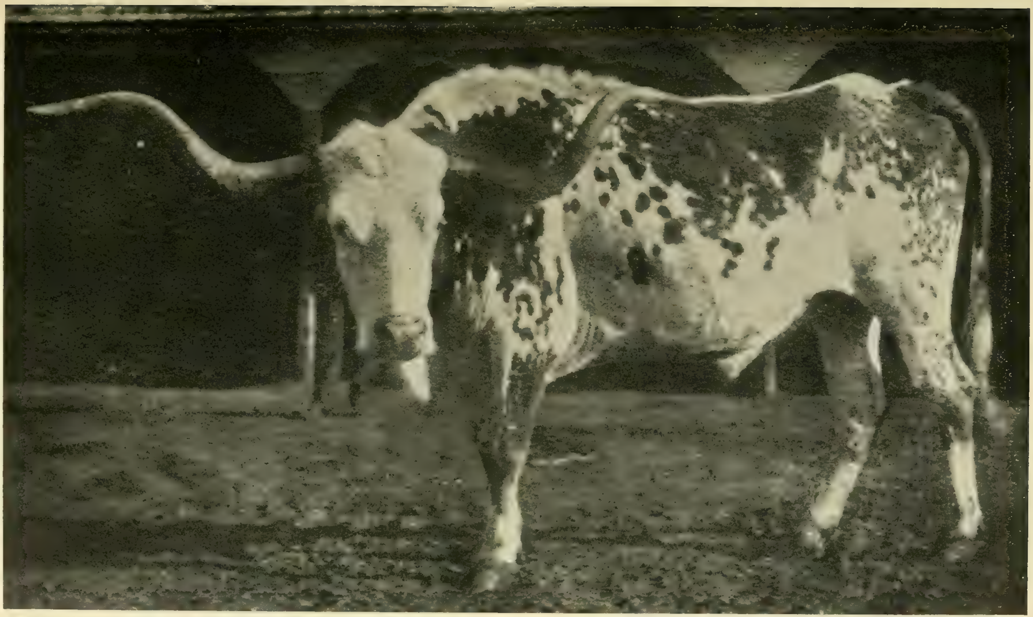


A. SKULL OF THE FREE MARTIN (p. 268). Described by Dr Berry Hart. *See* Appendix I.

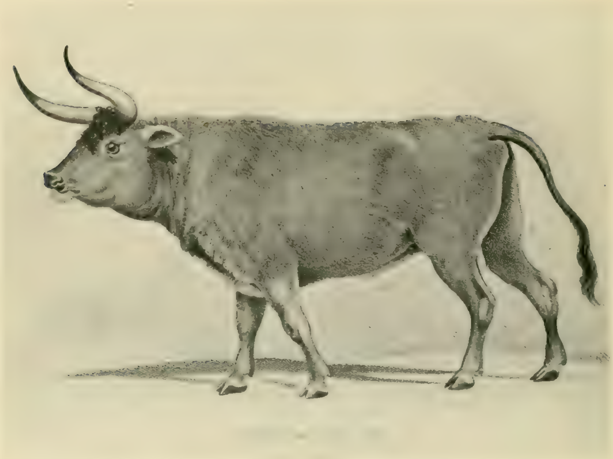


B. SKULL AND HORN CORES OF THE *Bos urus* OR *primigenius*.
Grierson Museum, Thornhill, Dumfriesshire. Width below horns, 12″; width of crown, 8⅞″; length of horn cores, 27″; girth close to skull, 13⅞″.

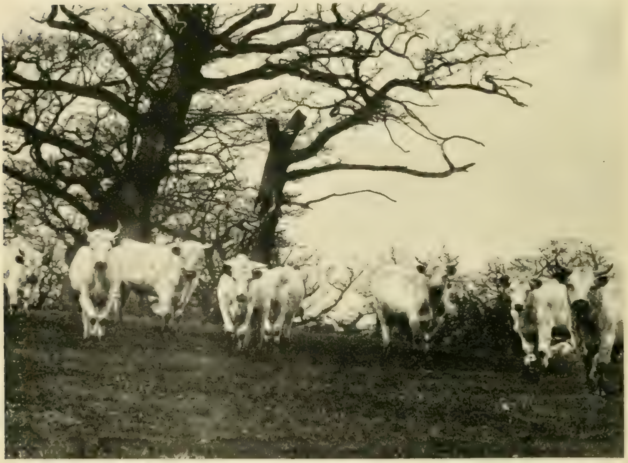
PLATE III.



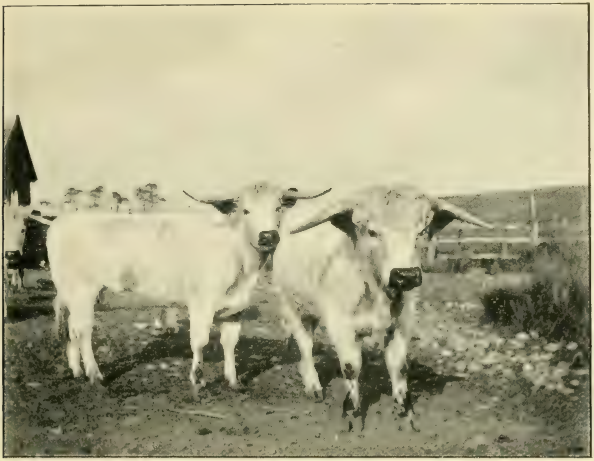
Texas Steer to illustrate Nature's tendency to develop bone and horn under conditions adverse to pedigree cattle, from a remnant of old Spanish blood; invaluable as foundation stock. Collected about 1895 by J. G. Kennedy on La Parra Ranch, South Texas.



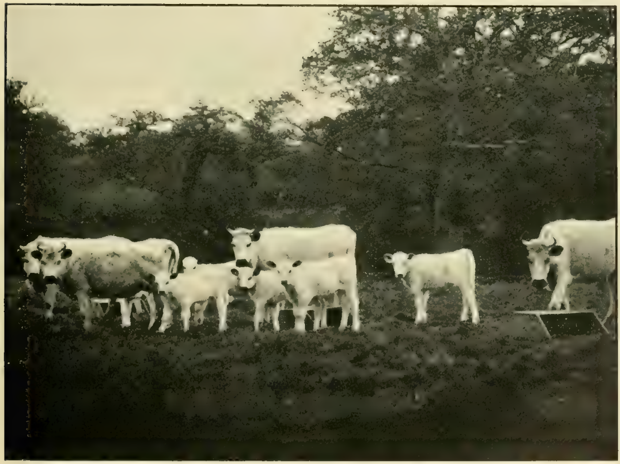
A. "URUS—THE NATIVE WILD OX OF SCOTLAND.'
From Cuvier's *Animal Kingdom*, vol. iv., 1827.



B. WHITE CATTLE, CADZOW PARK, BEFORE THE INTRODUCTION OF CHILLINGHAM BLOOD.
Owned by the Duke of Hamilton.



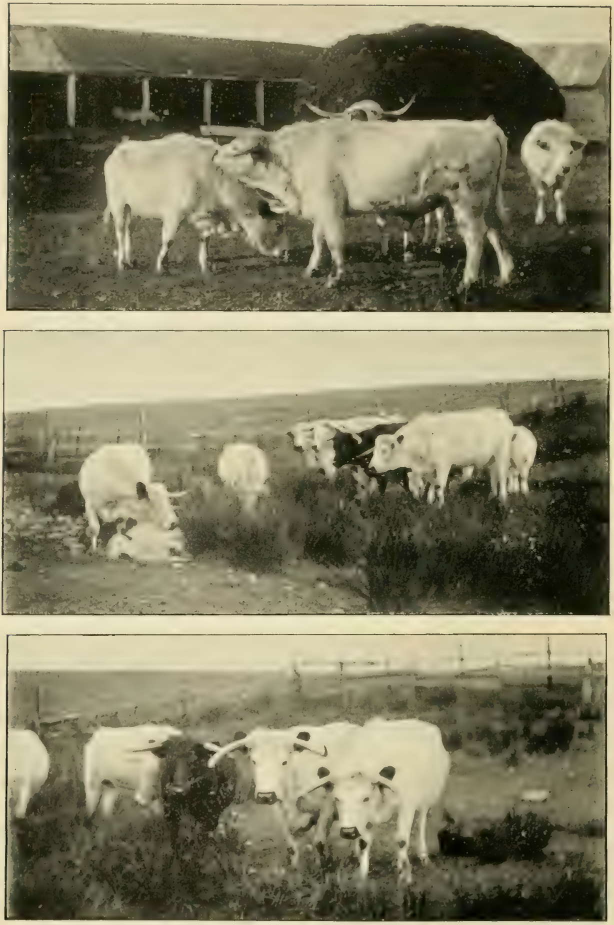
A. Bull and Heifer, Chartley Park.



B. Cows and Calves of the Hamilton White Breed in Cadzow Park.
Owned by the Duke of Hamilton.

[*C. Reid, Wishaw.*

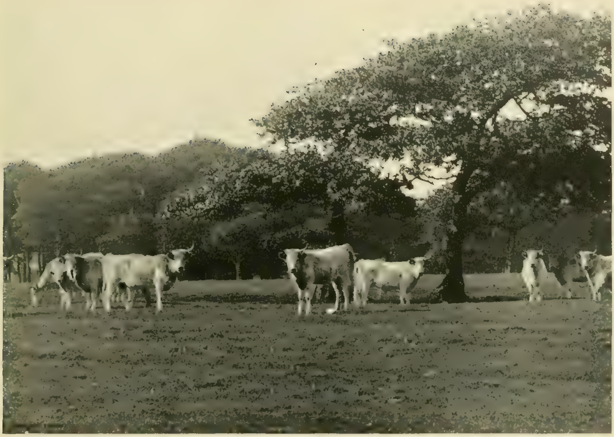
PLATE VI.



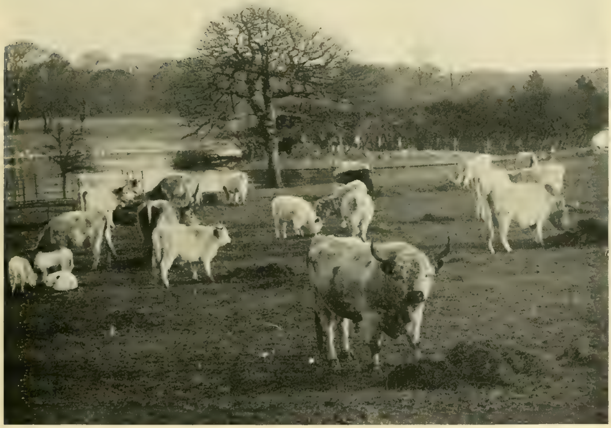
Wild White Cattle, Chartley Park.

Sold to the Duke of Bedford by Earl Ferrers in 1905.
The Bull and the Cow guarding the dead Calf were subsequently secured by Col. Congreve, and retained at Chartley.

[*Photos by Rev. C. F. L. Barnwell.*

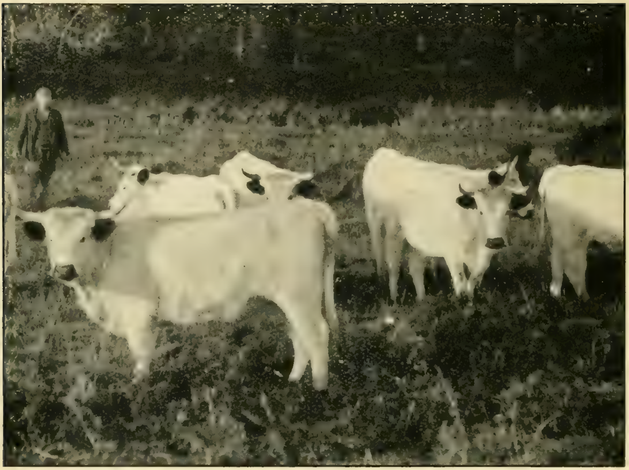


A. Wild White Cattle in Vaynol Park, near Bangor (of Scottish Origin).

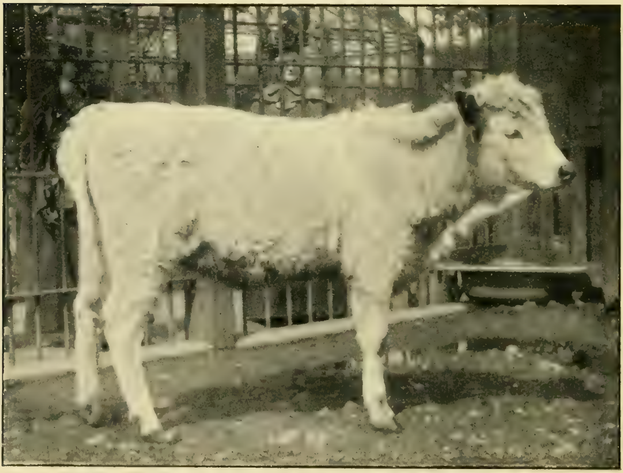


B. Wild White Cattle in Vaynol Park, near Bangor (of Scottish Origin).
The property of Charles Garden Assheton-Smith.

[*Both by Wickens, Bangor.*



A. White Welsh Heifers. An offshoot of the Black breed of Wales.
Owned by the late C. Mathias of Lamphey Court, Pembroke.



B. Wild White Calf born in the Zoo.
From a Vaynol Park cow and Chartley Park bull.

[Photo from "The Field," per J. E. Harting.

3rd December 1904, that the white of the wild cattle may have originated from domesticated albinos being let loose among them, is equally irrelevant, as no such thing as an albino appears in any of the remaining white breeds, and we have found no reference to that unmistakable condition in the history of any one of them.

The idea that the Romans introduced the progenitors of the white cattle is not new, for **Dr Robert Knox, the Anatomist**, speculates vaguely on the subject in the *Proceedings of the Royal Society of Edinburgh*, 2nd April 1838, and doubts their aboriginal character, "since they are not found in Ireland."

Dr James Ritchie, Keeper, Natural History Department, Royal Scottish Museum, who makes the most recent authoritative pronouncement in *Animal Life in Scotland*, 1921, says:—

> "It is possible that the sixteenth century 'wild' white cattle of the Caledonian forests may have been direct descendants of the *Urus*, though the weight of evidence seems to show that their relationship is more distant, and that they are rather the offspring, which have run wild, of a breed domesticated from the *Urus*. . . . It is generally allowed that the *Urus*, domesticated perhaps on the plains of Europe, is the ancestral form of the larger breeds of cattle in Britain at the present day. In Scotland the history of the earliest form of domestic cattle traces a course exactly the reverse of that of the Great Wild Ox, for, while the latter is abundantly represented in the early deposits, and decreases with the coming of man until it disappears, the former is absent from the early deposits and increases with the spread of Neolithic man until it occurs throughout the length and breadth of the land."

He draws attention to the fact that the writer of the *Statistical Account* of Selkirk parish, states that along with six skulls found in a "marle moss" at Whitmuir Hill, "in the neighbourhood of many brass axes," was found, "a Roman spear with which these animals were destroyed," nevertheless, he gives expression to the more modern common belief that:—

> "It is almost safe to assume that long before the Romans invaded Southern Scotland, in the early centuries of our era, the pressure of civilisation had driven the survivors of the Giant Ox beyond the bounds of the Scottish Lowlands," but admits that, "it appears still to have survived in the northern part of the kingdom," because of remains, "found in underground buildings or 'Eird' houses apparently of the Brochs or 'Pictish Towers' Period, in Orkney, Caithness and Sutherland." There is, he says, "some reason to believe, that the Broch Period, lasting towards the ninth or tenth century, saw the last wild British survivors of this great race of cattle long before they had disappeared from the dense forests of Central Europe, where they were believed by Prof. Nilsson to have existed in a wild or half-wild state even to the beginning and middle of the sixteenth century."

Whatever may be ultimately decided as to the white origin of wild park cattle, there is one pregnant sentence of Dr Ritchie's which brings the *Urus* into close proximity with those

Arctic conditions which from one cause or another engender white in the colourings, protective and otherwise, of animals which exist within their influence, which may point the way, when more is known of the facts from further finds of bone deposits, to the possibility of a white *Urus* having developed in the northern extremities of its habitat.

Although the **white coat** is not universal in the Arctic regions, the vast majority of birds and animals are white, including those like the great white bear that could not require the condition for protection against enemies. The presumption is that white having unsurpassed merit in conservation of heat, has been acquired for protection against extreme cold, in which the presence of air imprisoned in white hair has no small influence.[1]

Ritchie says:—

> "When the snows of the Ice Age disappeared from the Lowlands in one of the mild interludes which broke the severity of an Arctic climate and a coat of verdure spread over the plains, the *Urus* made one of the small band of animals which ventured into the southern counties of Scotland in quest of pastures. Its earliest Scottish remains have been found in interglacial deposits near Crofthead in Renfrewshire, where they were associated with bones of the Giant Fallow Deer or "Irish Elk" and of the Horse, as well as in the valley of Cowden Burn, in the same county. . . . The subsequent history of the Giant Ox in Scotland is one of gradual decline, and it is reasonable to assume that the dwindling of the great herds was connected with the appearance of man in the country. Nevertheless, the *Urus* lingered on in association with man in Scotland for many centuries, being gradually driven northwards into the wilds until within the confines of the northern counties it finally disappeared. Its remains have been found in juxtaposition with relics of Neolithic man from the Clyde Valley to Caithness; in the former case near the mouth of the Kelvin, in laminated beds of silt where many dug-out canoes, hollowed from solid trunks of oak, have been found, and in the latter in horned cairns belonging to the later period of the Polished Stone Age, at Camster, Ulbster and Clythe."

To the impartial observer it would appear that very few links of the chain seem wanting to connect the degenerate white British park cattle of to-day with the Gigantic Ox of Cæsar's time, and thus clear up various difficulties which at Present appear insoluble.

The domestication of cattle, both in this and all other countries, remains still an unknown and unworked-out subject;

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[1] "It seems to be occasionally true that individual hairs which were coloured may become changed into white ones, as happens when a man's hair turns white *suddenly*, the cause of the whiteness in both cases being the production of minute gas-bubbles inside the hair. When hair turns white *slowly*, there is not only a production of gas-bubbles, there is also an actual removal of pigment from the hair. That comes about in a very remarkable way, through the activity of wandering cells, called phagocytes."—From J. ARTHUR THOMSON'S *Nature all the Year Round*, p. 199.

but the following sketch by A. H. Cocks is perhaps as correct a résumé of the facts as is yet possible.

There was only one species of wild *Bos* in this country (Bison are not included in our "terms of reference," and Buffaloes never occurred here). It was called "Urus" by Cæsar (from the old German "Ur" = wild), and *Bos primigenius* by Linnæus. It pretty certainly arrived a long time before man; at any rate, from its size, and the massive character of its bones (especially the skull), a much larger *proportion* of its remains have come down to us than of the latter, and they are not easily broken up and overlooked during modern excavations.

The most ancient specimens discovered, dating from the early part of the Pleistocene Period, are of enormous size, and stood 18 hands and more at the withers. Man possessed no domestic animals so early, and certainly did not make a beginning with the *Urus*. Two living authorities, Professor O. Montelius of Stockholm, and Dr J. Ritchie of Edinburgh, have recently stated their reasoned beliefs as to the periods of Man's arrival in their respective countries, but that, however interesting, is beside the present mark, and I merely note that in the beds of the Peat Period, which began in Scotland somewhere about 7000 years B.C., remains of *Urus* have been frequently found, some 2 hands smaller in size than the early specimens, making them upwards of 16 hands at the withers. Naturally there would be individual variation, but still the big drop is clearly marked.

Domestic cattle were introduced here by the earlier arrivals of Iberian or Basque Neolithic people, and this must have been before the "North Plain" became the "North Sea," since to ferry large numbers of cattle across miles of sea is a task obviously beyond a primitive race. These domestic cattle were small, but Sir William Boyd Dawkins, who examined large quantities of their remains, found them devoid of character and by no means uniform (*i.e.* a domestic race, not a wild species).

We know next to nothing about the cattle inhabiting Asia and North Africa in early times, but we may reasonably suppose that domestication of individuals of more than one species took place in different parts of this wide field through a long succession of centuries. The late R. Lydekker thought that the Banting (*Bos sondaicus*) was the original domesticated species, on what grounds I do not clearly know, for it is not much like any European cattle of the present time. The invading Iberians may have started their migration from a wide area, and brought their various breeds of small cattle with them; and this migration was perhaps carried out very slowly during several generations of men, and many generations of cattle, so that by the time they settled in Britain, the breeds had become a good deal mixed. These small cattle were never wild in this country, and their origin is quite unknown; they cannot therefore be entitled to specific rank with a corresponding Linnean name *Longifrons*, such as was unfortunately bestowed on them by Professor Owen, the cause of much confusion. Some writers, appreciating this error, have furnished them with an English name, again unfortunately incorrect. "The Celtic Shorthorn" is a tremendous anachronism, because the cattle were established here about 3000 B.C. (earlier rather than later), and the first Celts, probably Goidels or Gaels, seem to have arrived here (*fide* Sir C. H. Read) about 400 B.C., forming the first Aryan invasion.

Cattle throughout the length and breadth of the country, during the remainder of the Pre-Roman (or B.C.) Period, and through the Roman Period embracing the first four centuries A.D., remained small, at any rate for the most part, but there are some puzzling "large *Urus*-like skulls of the brochs of Caithness and even of Orkney" noticed by Dr J. Ritchie, which seem to indicate a cross with the big wild species locally. Archæologists when investigating sites containing remains of early Man, constantly content themselves with enumerating "ox bones" among their finds, and entirely omit to mention what sort of ox; even my honoured preceptor and friend Professor Rolleston and Canon Greenwell in *British Barrows* (p 230), record "the head of a large adult ox (*Bos longifrons*)"—a contradiction in terms! This may be interpreted as a cross between the two animals, or simply as a large adult bull of the domestic race. Is it too much to hope that we may in future obtain such information as will clear up the question whether the *Urus* was used in this country as a sire (not necessarily domesticated) B.C.?

The Saxons, and especially the Angles, had evidently obtained such a cross, and apparently to a large extent, so that on the arrival here of these people, the character of domestic cattle speedily changed. The Normans seem to have continued what the Saxons had begun, and one of the two, most likely the Normans, introduced red cattle to some of the counties on the coast.

The *Urus* as a wild animal may have lingered to a later date in the almost untrodden wilds of the North of Scotland, but with that possible exception, it probably died out of Britain during the Early Iron Age, if not during the Bronze Age.

"In the days of huge forests and few enclosures, domestic cattle would from time to time escape from civilisation and become feral. It was doubtless some of these cattle that were enclosed in or about the thirteenth century when parks were formed. I suggest that the present white colour is merely the result of long continued in-breeding in a restricted area, encouraged so far as possible; just as white appears among Red Deer ("the White Hart") or Fallow, in parks, and even among the Laplanders' artificially restricted Rein Deer; but has very seldom been noted among them or other ruminants in a state of complete freedom."—ALFRED HENEAGE COCKS, *February* 1922.

On the other side, **Dr J. A. Smith**, "the learned Vice-President of the Society of Antiquaries of Scotland," thinks "the *Urus* may perhaps be considered to have still existed from the sixth to the ninth century." If so, why not till a later period, in the form of the wild white cattle of the country?

There is no sound foundation for the belief in the **untamable nature** of the wild cattle. Sir Charles Lyell, in his *Antiquity of Man*, says:—

> "Professor Rütimeyer of Basle has shown that among the remains of *wild* animals dredged up from the ancient Swiss dwellings, there are those of the wild bull." It is also "beyond question that, towards the close of the Stone and beginning of the Bronze Period, the lake dwellers had succeeded in taming that formidable brute the *Bos primigenius*. . . . In a tame state its bones were somewhat less massive and heavy and its horns somewhat smaller than in wild individuals."

Several specimens of at least three of the existing breeds, being handled quite young, have been successfully tamed and domesticated.

Tame domesticated white cattle, strongly resembling the wild breed, existed from very early times in a few localities in England, but mostly south of the Trent. (See Storer.)

The wild cattle in Chillingham Park,[1] near Belford, in the wildest and most beautiful part of Northumberland, the property of the Earl of Tankerville, are said to be the most characteristic descendants of the forest breed,[2] though they differ only in minor points of detail from those in Hamilton Park. Storer expresses the strong opinion that these cattle were not so persistently **in-and-in bred** for hundreds of years as is usually supposed; but that until not very long ago fresh blood was brought from other herds, and that in this way their existence has been prolonged.

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[1] Brought into public notice, by Bewick's celebrated engraving, and by Landseer's picture of "The Death of the Bull." A description of the hunt, with many valuable details of the Chillingham herd, are given in a *brochure* by the Earl of Tankerville, *The Chillingham Wild Cattle: Reminiscences of Life in the Highlands*, 1891: *Surrey Comet* office.

[2] Rütimeyer in *Domestic Cattle of the Ancients*, says of the Chillingham breed (after examining the bones from the Swiss lake dwellings, and comparing them with the skeletons of cattle of the present day), it is "the purest type that he has found of the original *Bos*."

Dr Ramage, in *Drumlanrig and the Douglases* (1876), quite unintentionally confirms this view by stating "there is a tradition that about 100 years ago the whole stock" (meaning the Drumlanrig herd of white cattle) "was sold and driven off to Chillingham." Hindmarsh gives the date as 1780, but does not record their destination. One of the visible indications of the close-breeding which has nevertheless taken place in this herd is the presence in certain animals of a "washed out" appearance, and of a rash or scurf on the skin. A tendency to barrenness points to the same cause. The annual increase of the breed is about one in five, a low rate, partly owing to the trampling of a good many young calves by the herd stampeding on the slightest provocation. It has recently been noticed that some cows live to a great age, one which died in December 1891 being eighteen years old; although the average age of the wild cattle generally is less than of those under domestication. At one period the bulls possessed a mane which developed with maturity but decreased with old age. The tendency to show black or blue spots on the skin, especially about the neck and head (to a greater degree in the other three herds than among the Chillingham cattle), increases with age.[1] There is also less tendency, especially in recent years, to produce black or other off-coloured calves. The skins are thin, another result of close in-breeding, and under the white hair they are white in colour, and thus differ in a most important characteristic from the dark-skinned and white-haired animals belonging to the Zebu race or humped cattle of India—the *Bos Indicus*—the skins of which are mostly jet black, though some varieties are of a yellowish or nut-brown colour.[2]

Storer says:—

> "The tongues of the Chillingham cattle are slate-coloured above, and of a reddish-brown colour on the under side[3]; the teats of the cows, unlike those at Chartley, are white; and, although the muzzle is black, *the under lip* is white." [In this breed only the naked part of the nose is black, there are no black hairs—only red.[4]] And again: "Besides the red ears ('inside and about one-third of the outside from the tip downwards'), a faint line of red hair exists, as if drawn by a pencil, immediately above the dark and hairless muzzle." ["Formerly they had a very strong predisposition

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[1] A possible parallel to this is to be noticed in the dark spots which develop on the ears of Border Leicester ewes as they grow old: probably owing to the hair becoming thinner, black spots on the hide show more distinctly.

[2] See a note by the Author in the *Proceedings of The Royal Society of Edinburgh*, 1887.

[3] Like those of the other white park cattle.

[4] The Chartley muzzle is all black and the under lip white, with the addition of a small black mark on each side of the centre. Cadzow lips are intensely black.—A. H. C.

to have red or black ears indifferently; and the uniformly red ear which has of late years prevailed is solely the result of selection, the black-eared ones (as all others improperly coloured), having been destroyed."] Quoting from Lord Tankerville, he adds: "In form they are beautifully shaped. They have short legs, straight back, horns of a very fine texture, thin skin [coat of hair], so that some of the bulls appear of a cream colour; and they have a peculiar cry, more like that of a wild beast than that of ordinary cattle."

In 1891 **Lord Tankerville** wrote:—

> "These peculiarities of colour and markings are very uniform and distinctive in the wild herd. They are pure white when first calved and licked clean by their mothers, but become of a more creamy white colour afterwards. The horns are white, with black tips; the hoofs and noses are black; the eyes are fringed with long eyelashes, which give them depth of character; their bodies are symmetrically formed; and their fine shoulders enable them to trot like match horses with amazing rapidity."

The herd has been well and graphically termed "**an absolute Monarchy**" under the tyrannical and forceful rule of the "King bull," who, in virtue of his superior strength and vigour, holds office usually for a few (two or three) years, or, in other words, till he is challenged and, sooner or later, overthrown by a younger rival in a fierce encounter. These deposed monarchs often lead a solitary life afterwards, and, becoming ill-natured with age and adversity, are dangerous to encounter. As males and females roam uncontrolled, the cows calve at all periods of the year, and most frequently in January and February. Twins are unknown.

A calf lies concealed like a fawn for two or three days in a secluded place, where the watchful mother, leaving the herd, visits it at intervals to suckle it. When it is strong enough to follow, it joins the herd with its mother—a habit which once a source of safety against predatory enemies in the forest, is a danger to the young under existing conditions. Superfluous males are castrated at three years, and shot like old bulls at six or eight years old.

The **average dead-weight** of the cattle killed between 1862 and 1889 was:—for bulls, 560 lb.; for cows, 420 lb.; and for steers, 570 lb.; and the flesh was of specially fine flavour and quality — the lean muscle being mixed or marbled with fat. The proportion of offal to carcase was remarkably small.

The cattle are wild and timid, concealing themselves among the elms and natural wood of the park, and they try to escape from the presence of man when they find themselves under observation. They are, however, extremely ferocious and dangerous at close quarters and at bay. During winter, when they are fed on natural hay, which is conveyed to them in a cart, the keepers can, under its protection, approach and observe them closely. Their instincts are essentially those of wild animals. Their keenness of scent and the habit they possess of hiding their young for a few days after birth are good illustrations of the fact. Domesticated cattle which have recently been reclaimed from the wild condition, such as the Somerford Park, the West Highland, and members of the South Wales breed, have retained this instinctive habit for generations.

The number of the pure herd dwindled from 80 in 1838, to 73 in 1890, 66 in 1892, and 58 in 1903-4. In June 1919 Lord Tankerville reported that the cattle were thriving and healthy, as they had always been. After an unusually hard time, with an unusual number of deaths, they represented the survival of the fittest. The total number was 56, consisting of 18 bulls (two to ten years), 3 bull calves, 32 cows, and 3 heifer calves. Probably one reason why the breed still survives and maintains its uniformity is that it was not, like other wild herds, seriously reduced in number by the last rinderpest outbreak in 1865.

Experiments in crossing some of the wild cattle with pure-bred Shorthorns were begun in 1875. At first a wild bull was mated with two high-bred Shorthorn heifers, but, owing to the failure of the first female cross to breed, all subsequent crossing has been between wild females and Shorthorn bulls. A steer resulting from the latter union was exhibited at Smithfield in 1888, and was placed third in a good cross-bred class. He was sold at £65 when within six weeks of four years old, his live-weight being 16 cwts. 2 qrs. 24 lb.; his dead-weight, 87 st. 10 lb.; loose tallow, 11 st. 4 lb.; and hide (very thin), 6 st. 4 lb. He had received no food but grass till within three or four months of the time he was exhibited.

In 1889 another cross-bred steer, three years and eight months old, gained the third prize in his class at Smithfield. He weighed 18 cwts. 2 qrs. 5 lb., and his dressed carcase scaled 96 st. The beef of both animals was pronounced to be of exceptionally good quality. Lord Tankerville says that:—

> "The practical results which have been obtained by blending the blood of the wild cattle with high-bred Shorthorns has been, in both the first and second crosses, to materially improve the shape of the animal, and particularly to develop the loins and most valuable beef-producing parts, as well as to increase the size and weight. In addition to this, an increased aptitude to fatten and to attain early maturity is very pronounced. These are the qualities transmitted by the Shorthorn, while the contribution of the wild parent is seen in increased vigour and constitution, with lightness of bone, together with improved gait, which is due to the finely laid shoulders of the wild animal. The colour may be said to be unchanged, with the exception of the nose and ears. In the former the black has given place to the flesh-colour or mottle, whilst the latter shows a broader fringe of red."

The foregoing note was penned before 1903.[1] After that time the mating of the female crosses with pedigree Shorthorn bulls went on until in 1905 the female Shorthorn herd on the wild foundation numbered thirteen, but some were later sold for killing. The fifth cross by the pure Shorthorn bull had then been reached, and soon after the beginning of the century entries had been made of females in *Coates's Herd Book*. The wild bull had not been used on the cross-bred females. The males were steered and killed fat off the grass at eighteen to twenty months old, and no more house-feeding experiments had been conducted. The two best steers sold in 1903, under two years, weighed 56 st. 2 lb. and 48 st. 8 lb., and sold at 8s. 9d. per stone of 14 lb. (clean carcase). The Shorthorn crosses retain their white colour and hardiness, but have assumed the Shorthorn shape, and the noses are gradually becoming clear of the early staining or mottling.

The Hamilton cattle in Cadzow Park,[2] Lanarkshire, numbered 44 in the spring of 1889, and 38 (22 cows, 11 bulls, and 5 one-year-old queys) in June 1892. They are less timid than they were in Storer's time, and are not nearly so shy as Chillingham cattle; nevertheless, they cannot safely be driven from one place to another, but have to be trapped within a narrow space shut off by folding gates when they are moved. When seriously disturbed they formerly showed nervous excitement by passing fæces of an abnormally liquid character, and, if the cows were suckling, a number of the calves grew ill or even died from the poisonous milk produced under the influence of fear. When young calves die the mothers often suffer from garget and have to be killed.

When the animals are shot, the carcases dress to about the same weight as those at Chillingham, both being smaller than an average specimen of the Ayrshire breed. The smaller-sized cows, killed in their natural condition after breeding, weigh as little as 16 st. The red meat of the Cadzow cattle is usually coarser than that of ordinary cattle and a deeper pink in colour. The flesh has a wild flavour, like the flavour of a pheasant compared with that of a barn-door fowl.

In contrasting the two breeds, it is found that the Hamilton cattle, as compared with those at Chillingham, stand higher on their legs; their faces are longer and narrower; their horns are lower set on the head, and mostly inclined downwards through a part of the length, lessening the space between the ear and the horn; and the hair on the body of adults is purer white, or less creamy. The jet-black tips of the horns, the dark eyes and black eyelashes, the black tongue, roof of mouth, and muzzle, the surrounding ring of black hair, and the black knee-caps, hoofs, and stockings almost reaching the knee in front, give a more definitely marked appearance to the animals than the less prominent and less varied and less extensive red-brown points of the Chillingham breed. It is well authenticated that till 1842 the Hamilton cattle were without horns. Youatt refers to them as "The Polled Cattle," and Dr Robert Knox (1838) said:—

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[1] Indebtedness for information is acknowledged to J. Noble, Shipley (Farm), Alnwick (for twenty years, *i.e.*, till 1903, bailiff at Chillingham).

[2] Cadzow Park (about 200 acres) is on the outskirts of what was once the great forest of Caledonia, where Bruce in 1320 and James VI. in 1500 hunted the wild bull. Its primæval oak trees, well past maturity, are shrinking, dying, and falling to decay, all the more quickly because of the pollution of the atmosphere with smoke and fumes from chimney stacks of the western Scottish coal and iron district.

> "They seem to me to bear the strongest resemblance to the Galloway breed, and the cranium of the wild ox of Hamilton differs very much from that of most domestic oxen, particularly in the breadth of the forehead, shortness of the nasal bones, and configuration of the interior of the nostrils. Many of the bulls have horns, whilst others are polled."

A skeleton of a polled specimen of the breed, from Dr Knox's collection, is preserved in the Anatomical Museum of Edinburgh University. One old servant, in 1889, recollected that the late Duke Alexander got rid of all calves that tended to grow horns. There is ample evidence to show that the points and characteristics of the herds of wild cattle have been maintained or altered to suit the wishes of individual owners by artificial selection, viz.—by destroying those that did not conform to a certain standard. There is a tradition that a West Highland bull broke into the park, and that through his descendants the cattle reacquired horns. Harting makes the statement with reference to the transition period that "the cows seldom have horns." The numbers were reduced to thirteen cows and a bull by the last epizootic outbreak of rinderpest in 1865. In breeding up the herd, it was impossible to kill off all animals with imperfect markings, so that in appearance the cattle became less uniform. Owing to the reduction in numbers the herd also suffered from intense in-and-in breeding. This was observable from the low condition of its members during winter, before the introduction of a Chillingham Park bull (Plate II.) in 1886. The constitution in this instance suffered more in loss of the hardiness required to resist inclement weather than in breeding powers, as in 1888 no fewer than twenty-one cows out of a total of twenty-seven bore calves. The bulls are put to the cows in July, and calves drop in April. The calves are weaned on the advent of frost, and after Hallowe'en (31st October) the herd is fed on Swedish turnips and good hay. A daily allowance of 3 lb. of linseed cake for a full-grown animal was discontinued during the World War.

On 23rd March 1901, the herd consisted of twenty-six cows, twelve bulls, five yearling queys, and seven newly-born calves. Eighteen calves were also expected. A bull is used only for three years; and, as spare bulls are kept to guarantee no lack of sires, he is sometimes four years old before being put to breed. Fights of a savage character have taken place from time to time among the spare bulls, which are separated from the other cattle. Two animals died of injuries received in one of those mêlées in January 1904, and one had to be shot in August 1909. Some old bulls have a good covering of curly or wavy hair on the forehead, the neck, and the front of the shoulders, like the Chillingham bull shot by the late King Edward when he was Prince of Wales, and the white Welsh bull in Plate XLIV. "Blackleg" is a scourge of the Cadzow Park herd—four one-year-olds having died in 1900. The wet spots that form when the roofs of old mine-workings underneath fall in have an evil influence. The application in 1897 of 130 tons of lime to a few acres of high dry land, tended to increase the strength of bone in the herd and make them healthier. The draining of the land and the destruction of the rabbits were also beneficial.

Chillingham and Vaynol Crosses.—To infuse new blood, a **Chillingham** bull was taken to Hamilton in 1886, and put to a selected number of cows. The crosses showed points of great interest to breeders of stock. Of six calves, the first product of this connection, four were almost pure white. In place of the black or the red markings of their parents, they had extremely small fringes of coloured hairs,—not more than a quarter of an inch broad on the tips of the ears. These four animals were in consequence destroyed as unsatisfactory.[1] One of the two remaining had black points, and the other red points like the sire. In the following year, 1888, two well-marked bull calves were produced, and they immediately exercised a salutary influence on the herd. So successful was the result that in 1891 all the cows, nineteen in number, were put to a half-bred Hamilton-Chillingham bull. Fifteen calves were born of this union, but only six possessed the characteristic markings of the Hamilton breed. Of the remainder, eight were white, or nearly so, and one was all black. The Hamilton-Chillingham bulls did not throw red markings in their progeny, and though one heifer calf came fourteen years later with red tipped ears—all the intermediate parents having had black points—even she bred well-marked calves. The crosses that appeared in 1893 indicated a noticeable development of constitutional vigour and hardiness. They showed a decided increase in size, and also in the amount and quality of hair, as compared with the pure Hamilton cattle. The faces were shorter, the foreheads broader, and the horns stronger and more upright.

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[1] The defective udders (blind quarters), at one time not uncommon in the herd, were due to inflammation resulting from "stocking," as badly-marked calves were shot early in the season, when their mothers were in full milk.

A Vaynol Park bull was procured in 1896 to aid in the substitution of "line-breeding" for "in-and-in breeding," and a record of the herd was kept for a time in three sections—(1) the Hamilton-Chillingham, (2) the Hamilton-Vaynol, and (3) the multiple crosses resulting from a combination of the two. Six out of seven of the Vaynol crosses in 1904 were properly marked. The progeny of the Vaynol bull is more fleshy than the others—heavier behind and lighter in front than the old breed, which had a massive neck and shoulders. They have the reputation, also, of being quieter, and of feeding more easily, although their disposition is more treacherous. Two barren heifers of the Vaynol cross were killed by a butcher in Hamilton at four and five years old. The beef was said to be the finest that had been seen in his shop for twenty years. This cross has a greater tendency to black spots on the body (both skin and hair) than the rest of the herd, only a few of which have black spots, generally obscured by white hair in winter. In October 1904 only three old cows remained of the original pure breed. The regenerated herd does not get so poor in condition in winter as the intensely in-bred cattle which preceded them, and the cows do not scour so badly on being excited. A crisis in the history of the herd was got over without any trace of tuberculosis, and the original type, in form and colour markings, has been steadily aimed at.

There is little doubt that the step taken at Hamilton was one in the right direction, although the practice of killing off the badly-marked calves kept down the total number of the herd for some years. In this case, with a well-marked bull, it might have been safe to keep the best white calves to breed to him. The chances are that most of their progeny would have had the proper Hamilton markings. There were two black calves dropped in 1904, and black-and-white, dun, and deep rich sable (but never red or brown) coloured calves frequently appeared before crossing was introduced. For some time before 1880 the average was three dark calves a year. The six heifer calves selected for keeping in 1903 were all well marked. They were the most typical lot seen since crossing had begun. Only one had Vaynol blood.

In 1915, as an economy war-measure, the herd, totalling thirty-seven, was reduced to twenty-one, and three died soon after. In 1917, six heifers that would not settle to any bull were killed. In 1919 the numbers stood at twenty-one, made up of four bulls (one an excellent descendant of the Hamilton-Chillingham blend, another a Vaynol of high merit, from a Vaynol-Hamilton cross), three cows, six queys by the herd bull, four yearlings, and four calves, but only one was a heifer.

In Chartley Park, near Uttoxeter, Staffordshire, there existed a wild breed, dating back to 1248-9, which till its sale in 1905 belonged to the Lords Ferrers. The herd numbered forty-one in 1852, and forty-three in 1893-5, although, before Storer wrote, reputed rarely to number thirty.

Under a charter of Henry III. permission was given to enclose a number of the wild white cattle ("Wild Beasts") from the Royal Forest of Needwood in "the mighty large park" of over 900 acres—an elevated but broken tableland in a state of nature.[1] Much of it is wild waste, poor, light, sandy and shingly, as well as heavy clay and moory soil, growing bent and coarse grasses, bracken, and straggling Scotch firs, birch, and ancestral oak trees—the last, like the aged oaks at Cadzow, falling into decay.

The cattle have strong deep voices, and in form and general appearance they strongly resemble the Castle Martin variety of the black Welsh breed. The colour of skin and hair, including the udder and the brush or extremity, as well as the rest of the tail, is white. The upper side of the tongue and the teats are black, and so are the points corresponding to the points of the Hamilton cattle, but not quite so extended. Athough more black or flea-bitten spots appear on the skin of the neck and shoulders when the hair is short, the spots visible in summer and the large areas of black skin growing white hair are not so extensive as in the Somerford cattle. Black is constant in the markings, and red is never seen. Some cows show a yellow tinge in the bare skin behind. The horns, which are long and white, with brown or black tips, descend in the manner of the horns of the South Wales breed. From the crown between the horns hangs down a top-knot.

Storer (edited) says:—

> "The lower part of the face is sleek and free from long hair, but on the top of the poll, reaching equally in all directions, and in front coming down nearly to the eyes, is a large, round, raised, spreading mass of long white hair, common to both males and females, and giving the faces a singularly demure, owl-like look."

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[1] *The Standard*, 5th April 1905, says:—"The enclosure of the cattle is believed to have taken place as the result of the passing of the Charta Forestæ (1225), which enacted that all lands afforested by Henry II., Richard I., and John, except the demesnes of the Crown, should be disafforested and freed from the various laws, so as to remit to former owners their rights."

He expressed the view that the Chartley cattle were in reality the progenitors of the Longhorn breed, which were the common cattle of Derbyshire and Staffordshire less than one hundred years before. This view was in harmony with Storer's belief that the wild herds took in new vigour and an extended lease of existence from time to time, by admitting selected crosses of their own blood with the cattle in their immediate surroundings. John Thornton, writing in 1874, when Storer's opinion was on record, gives a description of the Chartley cattle. Referring to certain Longhorn heifers he had seen, he says:—

> "There was some similarity to the Chartley cattle ; there were, however, no animals at Chartley with the horns strongly curved backwards and downwards, as was the case with some of the brown and brindled Longhorns. I should call the Chartley cattle, as compared with Shorthorns, of good medium size. Some of the cows had the appearance of good milkers. The body is well-formed, on well-set short legs, the top and under lines being nearly parallel ; ribs fairly sprung, and reaching close to the hip-bone ; shoulders nicely laid into the back, with good breast and fore quarters ; fore-legs short, with large broad arm, but very fine below the knee ; loin good, hips not very prominent ; hind-quarters long, with tail square behind, at nearly right angles to the back-bone, but from the hips to the 'touch' slightly drooping. The thighs were rather light, but the flank good ; neck slightly lower than the body. The bulls were deeper in the body, and perhaps shorter in the leg ; but the head was still more strikingly different. The cows' heads were very long—the bulls' short, with a very broad forehead, almost triangular. The chin of the bull was thick, and there was a great deal of loose skin about the throat, neck, and dewlap. The different character of the male and the female is very striking. On the whole it would seem that these were a breed of Longhorn cattle with almost Shorthorn shapes. Although other breeds of cattle may have been brought to a state of earlier maturity, little or no improvement in conformation and symmetry has been made in them."

It is interesting to note **Low's** general statement "that the wild white Forest breed, though reared for ages in parks in the west of England and Scotland, never assumes the characters of the Longhorned race."

Captain C. J. B. Masefield, M.C.,[1] during his archæological investigations in the William Salt Library, Stafford, found an account of a case conducted at Stafford against Earl Ferrers for damage done by cattle being driven for him from his estate in South Wales to Chartley. This raises a strong presumption (nothing more) that the very striking resemblance of the Chartley breed to Welsh cattle, especially to the White South Wales variety, arose through the introduction of outside blood.

S. A. H. Burne has drawn attention to the following statement in vol. x. (New Series) of the Salt Society's *Collections for a History of Staffordshire*:—

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[1] Died 2nd July 1917, in the hands of the enemy, from wounds received in action at Lens 1st July.

> "That on 3rd June 1507, a herd of 'oxen kyne' intended for Lord Ferrers' Lands at Chartley were being driven thither by a number of Welsh Drovers."

It would appear that the Devereux family who came into possession of Chartley in 1460 as Barons Ferrers, owned Lamphey Court, then spelt "Llamphey," in Pembrokeshire, and that white cattle existed there or in the district long before the rehabilitation of the white Welsh breed by Colonel Mathias in 1882.[1]

The Chartley cattle resembled those at Hamilton in not being so wild as the cattle at Chillingham; yet they refused to be driven.

Till near the close of the nineteenth century the animals exceeded those of both the Northern breeds in size and substance, conspicuously in the weight of the fore-quarters, but about that time they decreased rapidly in size and in constitutional vigour, as a result of intense consanguineous breeding, increasing in power for evil with decreasing numbers. One fatal result was the serious losses by death from miliary tubercle, after the closing years of the nineteenth century. Practically all the animals slaughtered exhibited what butchers term "grapes"—the lungs appearing as if peppered with yellow rice, and the unnatural growths also extending to the web-fat (great omentum) enveloping the bowels.

W. Carless, the veterinary surgeon from Stafford, who was in attendance for some years before the removal from Chartley Park, had been summoned also in the seventies, when several animals died. In a letter to the Author, dated 5th February 1905 (indebtedness acknowledged), he reported "that post-mortem examination then revealed tuberculosis." Those visibly affected were slaughtered, and some acres of the park were drained. The herd recovered and increased in number for a time. After more than twenty years a similar but more serious collapse occurred in 1901, when it was reduced to twenty-four—a figure still further diminished to seven in May 1905, when all but a bull and cow were removed to Woburn Park[2] on their purchase by the Duke of Bedford. Isolation at birth and foster-mothers were tried, but the inherent wildness of the creatures even at this early stage was not overcome, and all efforts failed. It was the opinion of Carless that tuberculosis was introduced into the wild herd, probably years before symptoms of disease were noticed, by "ley" cattle (for temporary grazing) admitted into the park. Herding together in or near the shelter sheds while consuming hay in winter provided ample opportunity for the spread of the disease, especially among cattle in poor condition suffering from constitutional weakness due to extreme in-and-in breeding. The cattle were for many years fed during winter on meadow hay cut in the park, and about 1½ lb. of cake daily was latterly added. After coming into close contact with the attendants they became quite docile with them, except when with young calves; but several cows showed suspicion of strangers, and clearly indicated that it would not have been safe for anyone but a keeper to approach near, even at feeding time, when they were quietest. As the bulls were latterly shut out of the herd, the majority of the calves came at a seasonable time in spring. Few cases of abortion occurred. Heifers usually bred when about two years old.

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[1] See *Transactions of the North Staffordshire Field Club* (Zoological Section), vol. xlv., 1911, pp. 63-82.

[2] On 8th December 1904, the herd was offered at auction by Walton & Lea in London—upset price, £1000. As only one bid of £100 was given they were withdrawn, and subsequently sold privately.

Black (never black-and-white) calves were not infrequently dropped by cows of this breed; but with the exception of one female born in March 1892 (which gave birth to a beautifully marked white bull calf in 1904, and a black bull calf in 1905), they have been regularly destroyed, to preserve the characteristic colour markings. The black heifer (not distinguishable from one of the black South Wales breed) had a white udder and spotted teats. A local legend, that the advent of a black calf in the herd prognosticates an impending disaster to the House of Ferrers, led to the chronicling of the appearance of one such off-coloured animal in 1266 and another in 1321, which, with others referred to above, are doubtless cases of atavism. The parental instincts of a cow were strong while the calf was young, yet calves handled by man were liable to be deserted by their mothers. After a few weeks a cow permitted any calf in the herd to suck her; a fact which is specially interesting, because domestic cattle rarely allow other than their own calves to suck. The calves were weaned when about six months old. The average annual number of calves reared about 1890 was ten. Leadbetter, a butcher who bought some of the cattle, informed us in 1904 that for years after 1890 he killed four-year-old bullocks from the park up to seven and eight score (a score = 20 lb.) per quarter—the weight mentioned by Storer thirty years previously. Old cows killed and dressed to five and six score per quarter.

General Congreve, V.C., the purchaser of Chartley Park and part of the estate, secured from the Duke of Bedford, who bought the cattle from him, two excellent specimens of the breed. The cow gave birth to a beautiful bull calf in 1905, and with a view to recruit the herd fifteen additional cows were put to the old bull. Most of them were white, cross-descendants of the old breed, or white varieties of the Welsh black breed, and four West-Highlanders. Some of the progeny possessed in a marked degree the characteristics of the wild cattle. After all the pure bred animals had died or had been removed, the imported females were sold off. The old bull was set up complete and presented by the Duke of Bedford to the Natural History Museum at South Kensington.

"The herd transferred to Woburn in May 1905, consisted of four adult cows, one young white bull fifteen months old, and one adult black cow with a black bull calf five weeks old at foot. In the end of 1905 an old bull and cow, which had been retained in the first instance, were received from Chartley. Both died within two years. A young heifer of eighteen months was also received from Chartley in April 1907 and survived till December 1917. In 1906 the experiment was commenced of breeding from Longhorn cows by a pure Chartley bull. This plan was continued and appears to have restored the constitution and stamina of the herd. No other cross except that of the Longhorn cow has been used.

"The total number of the herd at the present date (2nd June 1919) is nineteen, as under:—four males, white with black markings; one male (black); fourteen females. I think it may be said that the old breed of Chartley cattle has been restored. The herd is healthy. The black markings on the muzzle, ears, and feet are correct, and the horns have the right downward curve."[1]

The **position** and **prospects** of the Chartley cattle were discussed in *The Field* of 1st October 1904, by J. E. Harting, and by the Author in *The Times* of 29th November 1904, when the introduction of fresh blood was strongly urged as a remedy against further degeneration—preferably South Wales blood, owing to its probable nearest relationship.

In Vaynol Park, near Bangor, is another herd of wild white cattle with black points, which in 1892 numbered fifty-five, including twenty calves and two bulls, and in January 1899 fifty, consisting of twenty-four cows, seven bulls, three steers, twelve yearlings, and four calves. The following extract from *The Field* shows their origin to be Scottish:—

"The herd at Vaynol Park, belonging to Geo. W. Duff Assheton-Smith, was introduced there by him in 1872, when he purchased a portion (twenty-two) of the herd then owned by Sir John Orde of Kilmory, Argyllshire, from whom, in August 1886, he purchased the remainder, thirty-two more. This stock was originally at Blair-Atholl, Perthshire, and in 1834 was sold to the Marquis of Breadalbane, Taymouth, and to the Duke of Buccleuch, Dalkeith." (See next page, also Storer; Harting (*Extinct British Animals*); Jesse, etc.)

The **Atholl herd** of the Duke of Atholl were genuine wild white cattle with black points. The cows that went to Taymouth would not breed to the pure white bull; but both male and female are said to have crossed with Highland cattle, and to have produced calves which were exhibited as Highlanders at the Highland Society's Show "without a white one amongst them." This circumstance is evidence of the close relationship of the West Highland breed to the wild white cattle of the country. The Dalkeith section

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[1] From a letter to the Author by the Duke of Bedford.

> "consisted of six cows and two cow calves, one bull, and five oxen. They were all white—pure white—and they had all black muzzles ; but the black was confined to the muzzle itself, and did not affect the skin around it, which bore hair. The orbits of their eyes were black, and the hoofs black or striped with black. The ears were generally tipped with black, and in many there was also more or less black inside, but in a few the black hairs on the ears were scarce, though in none altogether wanting. Their horns had black points, and were very sharp. Some had dark specks on the skin, which, however, grew white hairs ; sometimes, however, calves showed black hairs mixed with the white when new-born and wet, but these did not show afterwards. They resembled ordinary Highland cattle, being short-legged, straight-backed, and having long silky hair."

The breed was semi-domesticated at Daikeith, as the cows were kept under cover and milked, and the calves reared by hand till they were turned out to grass, when they sucked, and milking ceased. The whole of the Dalkeith herd was slaughtered in 1838, except one pure young Atholl bull purchased by Sir J. Powlett Orde to found the **Kilmory herd**, which was carried on for nearly fifty years. About half a dozen pure white West Highland (Kyloe) cows with black points, like wild cattle, were purchased and successfully mated with the bull. Some years later he was exchanged for Lord Breadalbane's bull, which also bred well in the Kilmory herd till 1851 or 1852, although he failed to breed with the too nearly related Breadalbane cows. A pure white West Highland bull calf with black points followed the two wild bulls which had been the sires of the herd for the first fourteen years of its existence. He did much good, and introduced into the herd more substantial hind quarters, as well as the curly neck—not an uncommon feature among wild cattle. No black or coloured calf has appeared in recent years. At first, after crossing began, there was a tendency in some calves to have defective black points ; but these calves were not kept for breeding.

In 1878, nine 2½-year-old white heifers bred by Sir John Orde were bought by Joe Brown of Hermitage, Dalbeattie, for 10 guineas each, and sent through Burrell of London to the manager of the Royal Shaw Farm, **Windsor**. They were used for crossing with a Shorthorn, but they remained so wild and untractable, and the calves were so far from coming up to expectation, that after two years they were fattened and sold to a local butcher.

Fresh blood was introduced at Kilmory by a bull which was got by exchange from Hamilton in 1896.[1] Sir John Orde, writing in June 1887, said he believed the herd had slightly declined in fertility, and had deteriorated in bone and horn.

The Vaynol Park cattle were distinctly of the West Highland type, with a substantial, well-formed body on short legs, and horns of medium length. Though the herd move a long way off, should anyone attempt to come to close quarters, they are not nearly so wild as the Chillingham cattle, and make no attempt to escape from the view of people at a distance. The animals are given hay during severe weather in winter. No case of warble-fly attack has ever been observed among them. They numbered forty at G. W. Duff Assheton-Smith's death in 1904.

Early in 1915, under war necessities, when 70 odd acres of the park were broken up, the cattle, as also the deer, were greatly reduced. In 1919 the herd consisted of eight cows, a two-year-old heifer, and a Hamilton bull acquired in 1915, the sire of the season's drop of seven calves. Of the first three calves born, only one was a good typical specimen, one white with poor markings, and one dark roan.

In June 1890, a yearling bull from the Chartley herd was sent to the **Zoological Society's Gardens** in London, where in due time he mated with a heifer sent in November 1890, as a yearling, from the Vaynol herd. A fine bull calf was the first result of this union, perfectly white, with jet-black nose and ears. A. D. Bartlett reported that "both the adults and the calf are wonderfully tame, and will lick or feed from the hand, or allow anyone to pat or stroke them without exhibiting fear or anger." The original (Chartley) bull succumbed to the Regent's Park fogs, and died in November 1893, having sired No. 3 (born May 1892). My recollection is that he only sired that one calf, but from the dates of birth given in the table forming Appendix E, it seems likely that he also sired Nos. 4 and 5. Anyhow after that time No. 3 was bred to his dam No. 2, the calves being therefore one-quarter Chartley, three-quarters Vaynol. There is some uncertainty about the number of years this arrangement continued, but I believe it went on until the death of the original cow (No. 2) in December 1902, when her place was taken by one of her daughters. Perhaps No. 2's last calf was No. 13, a heifer born March 1902, which died the same day as No. 2, December 1902 ; and No. 14, born November 1902, may probably have been from one of the previous cow calves. This stock (though the identity of the cow seems doubtful) probably lasted until 1910, in November of which year a heifer was sent from Vaynol, and a Cadzow bull in 1912. The Chillingham cow unluckily broke her leg and had to be killed, and neither of that pair has bred in the Gardens, nor has the Chartley and Longhorn bull (from the Woburn herd).

From 1892 till 1902 inclusive, twelve calves were produced—eight heifers and four bulls. The 1903 calf was still-born, and the cow was too fat to breed in 1904. The breeding stock of two animals has been kept up by preserving the male calf (3) of 1892, the first born in the Gardens (which was bred to his mother), and that of 1898 (killed May 1912), skull (with others) preserved at Poynetts, and the heifer calf (11) of 1900 (died August 1910). All the others born alive before 1905 (we say it with regret) were slaughtered in accordance with the conditions imposed by the donors. This embargo having been removed, the bull calves dropped in April 1905 and May 1906 were sent to the Duke of Bedford to mate with the remnant of Chartley Park cattle that went to Woburn.

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[1] See a Report by Laisters F. Lort on the Vaynol White Cattle in the *Transactions of the North Staffordshire Field Club*, 1898-9, p. 55.

The record of cattle born in, or presented to, the Zoological Gardens is given in Appendix E, which see.

In the Report of the **Committee** appointed by the **British Association** to investigate the herds of wild white cattle in Great Britain (reprinted, slightly abridged, *Zoologist*, November 1887), the following important suggestion was made, which, it is hoped, may yet be given effect to :—

> "It would be extremely interesting if the noble owners of the three ancient herds (Chartley, Chillingham, Cadzow) would co-operate with some other owner of a large park—if haply such could be found—willing to undertake the following experiment, namely,—that all calves which would ordinarily be converted into veal or steers, should instead be sent to build up a new herd, which, combining the blood of the only remaining ancient herds, and with no artificial selection exercised, might be expected to revert more nearly to the aboriginal wild type than could be achieved in any other manner."

All the foregoing breeds are registered in *The Park Cattle Society's Herd Book*, vol. i., issued in 1919 under the Patronage, Presidency, and Vice-Presidency respectively of the Earl of Tankerville, the Duke of Bedford, K.G., and the Duke of Hamilton: Hon. Secretary and Treasurer, Sir Claud Alexander, Bart. With the exception of the Poynetts Herd, the following brief notices of the recently formed mixed herds have been borrowed, slightly condensed, from the *Herd Book*, pp. 15 to 17 :—

The Dynevor Herd.—*Owner*—The Lord Dynevor, Dynevor Castle, Llandilo, South Wales. From the earliest times white cattle with coloured ears have existed in Wales side by side with the ordinary black breed, and it is curious to observe that all the early records describe the ears as *red*, because one would have expected the ears to be black if the cattle had merely been "sports" from the black breed.

Storer tells us that in the Dimetian code "the Lord of Dynevwr" is to have, for the infringement of his prerogative, "as many white cattle with red ears as shall extend in close succession from Argoel to the Palace of Dynevwr with a bull of the same colour with each score of them." Probably, however, they were eventually crossed with the black herds and so acquired black points instead of red ones, at any rate the markings of the present Dynevor herd are uniformly black. In recent times changes of blood were obtained from a Vaynol bull, and also from the Wilcote herd, and that of the late Charles Mathias at Lamphey Court.

The Faygate Herd.—*Owner*—Sir Claud Alexander, Bart., Faygate Wood, Sussex. This herd was founded in 1908 with cattle from all available sources, a Chartley-Vaynol bull bred in the Zoological Society's Gardens, a bull and two heifers from Cadzow, a bull and a heifer from Vaynol, and several cows and heifers from the polled herds at Somerford and Northrepps. At a later date a Chartley bull and three cows were obtained from the late F. Brace, by whom they had been driven over from Chartley to his place at Needwood (their original forest home).

From these animals the present stock have been bred on utility lines as dual-purpose cattle of the horned variety, but it is now intended to divide them into two herds, one horned the other polled, and, to this end, the latter section has been reinforced by the purchase of three heifers from Kelmarsh.

The Poynetts Herd of Alfred H. Cocks, Skirmett, near Henley-on-Thames, was started in May 1913, by a gift from Sir Claud Alexander, Bart., of a little heifer-calf born in April, of Cadzow and Chartley parentage. In November 1914, the Zoological Society presented to it a black bull bred in the Gardens in the previous December, of Cadzow and Vaynol parents. He was slaughtered in November 1918. To these have been added as occasion offered (by gift, or purchase at very moderate prices, from Sir C. Alexander), other animals ; and now this herd contains all the surviving examples of the interesting ancient breed from Chartley Park. The herd includes one pure-bred bull, one cow, and three heifers (one of the latter is, however, black), and other animals having Chartley blood from half to seven-eighths ; and the owner's object is to perpetuate the breed, pure so far as possible, and helped out by breeding up from cross-breds.

The Solva Herd.—*Owner*—Captain J. H. Howell, Trewellwell, Solva, Pembrokeshire. This herd was founded in 1918 by purchases at the dispersal sale of Captain Mathias's cattle, which formed part of the old Lamphey herd bred by his father, the late Charles Mathias. These cattle have received constant crosses from the Dynevor and Wilcote herds, the present bull having been bred in the latter, though his dam's sire hailed from Dynevor and her grandsire was a Vaynol wild bull.

The Wilcote Herd.—*Owner*—George H. Dawkins, Wilcote, Charlbury, Oxon. This herd was founded in 1895 by the purchase of a bull and a cow from the Lamphey herd, followed by others from the same herd and also from Dynevor at intervals of two or three years down to the present time. These three herds are now closely allied. A complete outcross was, however, obtained in 1906 and 1907, by the addition of a heifer and a bull from Somerford, and again in 1909 by a bull from Faygate, whose sire was a Cadzow bull and his dam a cow from Somerford.

CHAPTER III

CATTLE (*continued*)—SHORTHORNS

Definition of the Term "Cattle"—Dual-purpose Cattle—Special-purpose Animals—General Points of Beef-producing Breeds—Skeleton of a Cow Detailed—Historical Sketch of the Shorthorn—Descent from Teeswater Breed—Characteristics and Origin of the Teeswater Cattle—Early Improvers—Charles and Robert Colling—Methods and Aims—Booth and Bates—The Booths and their Cattle—Thomas Bates—Bates Tribes—Comparison of Booth and Bates Types—Other Early Breeders.

THE term "cattle,"[1] though originally used to designate live stock in general (even including bees), and though largely used by the older writers as including both horses and oxen, is now generally restricted to bovines. These are spoken of in the older books as "horned cattle," "black cattle," or "neat cattle," obviously, however, without reference to the actual presence or lack of horns, or to colour or build.

British cattle, in common with those of Europe generally, are scientifically classified under the designation of *Bos taurus*. The *Bovidæ*, to which group they belong, include also the domesticated zebus or humped cattle; two or three species of wild or semi-domesticated cattle found in the East; the bisons of North America and Central Europe; the yak; and the wild and domesticated buffaloes, of which the smallest, the *Anoa depressicornis* of Celebes, is no larger than a sheep.

In Britain cattle are no longer used to any extent for work purposes, although in earlier times they were more largely employed in farm labour than were horses, and although they continue to be so employed in many other countries. British cattle are kept either for the production of beef or milk or both, and are accordingly classified as beef, dairy, or dual-purpose. See Appendix A, "Live Stock Societies—Cattle."

Dual-purpose Cattle.—The antagonism to dual-purpose cattle on the part of breeders of special-purpose animals has, during recent years, largely disappeared. The merits of the genuine farmers' cow "that will pay her way at the pail and add a calf that yields satisfactory feeding quality when finished for the butcher," are being generally accepted by the vast majority of people interested in the subject. A hundred years ago practically all breeds were dual-purpose, and duality was not confined to the production of meat and milk, but in many cases included the capacity for farm work. The exaggerated importance attached to the production of meat or the making of milk has been fostered since the middle of last century by the prominence given at the great shows to certain breeds, by concentration on one or other object,—the production of meat or of milk.

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[1] *Cattle* is philologically an interesting word. The original Latin *capitale*, which appears in the English *capital*, was shortened into *captale* and reduced in French to *catel* and *chatel*, goods and *chattels* (*cf.* the two forms *kirk* and *church*). A similar development of meaning occurs in the word *stock*: contrast *stock-broker* with *stock-breeder*.

Such cattle are not bred under the normal practices of agriculture, and require favourable conditions, forced feeding, and exceptional management which few but wealthy breeders can afford. It has been well said "the special-purpose animals are for the few—for the classes; the dual-purpose animals for the many—for the masses."

The special-purpose animal may be of great merit, and not a few breeders have made fortunes by producing them; but the dual-purpose animal is a natural product which has steadily come to its own as specialisation has become more defined and as new tests of merit have been applied. Professor **Joseph Wing**, who has been dubbed the father of the system for the production of **baby beef**, enthusiastically declaims in favour of dual-purpose breeds, declaring they are the best suited for his system, and further that they are the most profitable type of cattle for ordinary farming purposes on even the highest priced farm land.

Nevertheless, the **single-purpose** breeds have their special place in the economy of breeding, for the production in comparatively limited numbers of pure-bred animals of high merit to maintain their line of descent, and also to supply a larger number of less perfect yet meritorious animals to pass on their special characteristics to much greater numbers of common cattle. The striking change which has taken place in the general opinion since the beginning of the present century, and has been specially emphasised by the experiences of the Great War, is seen in the claim now made by nearly all the breed societies of prominent beef breeds to the existence of meritorious milking strains among them.

The vast majority of cattle of the European race in the world are dual-purpose animals, roughly estimated at 80 per cent. in this country and 98 per cent. in the United States of America.

Before describing the characteristics of the different beef breeds it will be well, in order to avoid repetition, to state briefly the points generally applicable to those kept for beef production.

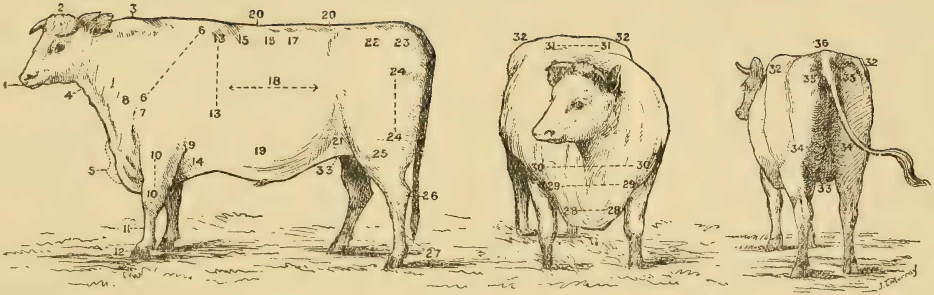

FIG. 5.—ILLUSTRATING THE POINTS OF AN OX. (After Thomson.)

1. Muzzle.
2. Poll.
3. Crest.
4. Throat.
5 Dewlap.
6 to 6. Shoulder.
7. Shoulder point.
8. Shoulder- or Neck-Vein.
9. Elbow.
10. Arm.
11. Shank.
12. Hoof.
13 to 13. Crop.
14. Fore Flank.
15. Fore Ribs.
16. Mid Ribs.
17. Back Ribs.
18. Barrel.
19. Belly
20. Spine.
21. Flank.
22 to 23. Plate.
23. Rump.
24 to 24. Hip.
25. Thigh.
26. Hock.
27. Hind Leg.
28 to 28. Brisket.
29 to 29. Bosom.
30 to 30. Chest.
31 to 31. Loins.
32. Hooks or Hip-bones.
33. Purse.
34. Twist.
35. Pin-bones or Catch.
36. Tail-head.

N.B.—See page 188 for a list of the champion cattle at Smithfield Show since its initiation.

General Points of Beef-producing Cattle.

Masculine or *feminine* character should be fully and naturally expressed in the bull and cow respectively.

General appearance, low-set, compact, and blocky, with great depth and width of carcase and level lines, but withal stylish and showing quality.

Head, wide between the eyes and flat across the *crown* (with exceptions in the polled breeds). Face straight, neither "dished" nor "Roman," and short or medium in length from the eyes to the muzzle; the latter broad and full, with large nostrils; the jaw wide and the mouth large; the eyes large, placid, and clear. Horns, if present, symmetrical; ears full, of fine texture and well covered with hair.

Neck of medium length, full at the "neck-vein" or "shoulder-vein" where it joins the body, and tapering towards the head, which it should join without thickness or chokiness; straight from the shoulder top to the roots of the horns in the female or steer, and rising into a crest in the bull.

Body, long and deep, equally balanced before and behind; back broad throughout its length, smooth and even, straight from the shoulder to the tail-head, and thickly and evenly covered with firm flesh. Rolls of fat on the loin or patchiness at the tail-head are objectionable. The most valuable cuts of beef are in the back, loin, and rump, so that thick flesh on these parts is of first importance. The trunk, looked at from any point of view, should resemble as nearly as possible a parallelogram; the ribs well sprung or arched, the chest wide, full, and deep; girth large, the brisket extending well forward and wide, the fore flank well filled up. Flank full and deep, and even with the underline.

Shoulders thickly covered with flesh and laid well back over the ribs, so that the natural depression behind them should not be too pronounced; the shoulder blade (*scapula*) lying closely to the trunk and the shoulder point "snug" and thickly covered.

The hind-quarters full and well packed, long and uniform in width, the hook bones (*ilcum*) not too prominent, and the pin-bones (spine of *ischium*) set well apart. The tail-head smooth and level, hip-bones (*innominate*) smoothly covered; thighs broad and thick but not bulging behind, well let down towards the hocks. Twist or inner thigh deep and full. The *tail* thin, set on well back but not high, and falling perpendicularly.

The legs straight and short, the shank bones flat and fine but not too small.

The skin moderately thick (not papery), pliable, and mellow or mossy to the touch. Hair soft and abundant, covering all parts well.

The lines of the body flowing, not sharp or abrupt, with a general balance of parts.

The carriage stylish, with the head carried well up, and the movement free and easy.

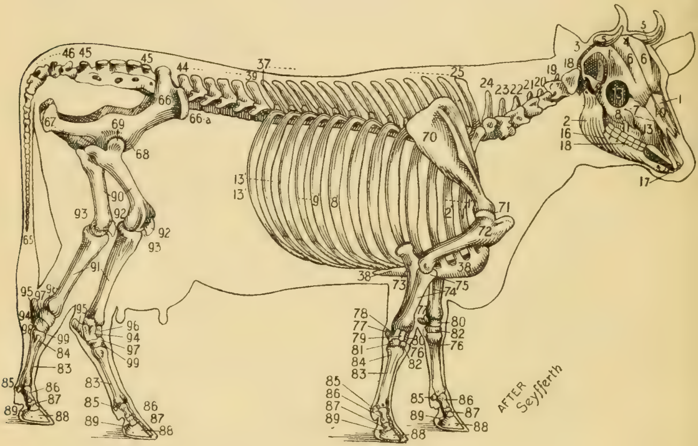

FIG. 6.—SKELETON OF COW.

HEAD.

1, Upper jaw; 2, lower or under jaw; 3, occipital bone; 4, frontal protuberance; 5, horn cores; 6, frontal bone; 7, lachrymal bone; 8, malar bone; 9, zygomatic bone; 10, nasal bone; 11, great maxillary bone; 12, six upper molars; 13, great maxillary bone; 14, temporal bone; 15, orbital cavity. In the lower jaws (2) are—16, the six lower molars; 17, the eight incisors.

TRUNK.

18-24, 7 cervical vertebræ, the first is—18, the atlas; 19, the axis (or rotator). 25-37, 13 dorsal vertebræ, with 1'-13' the ribs, of which are named:—1'-8' true ribs; 9'-13' false ribs. The first eight extend to—38, breast-bone or sternum; 39-44, 6 lumbar vertebræ; 45, sacrum; 46-65, 20 coccygeal vertebræ. The number of these varies from 18-20; 66-68, bones of the pelvis; 66, ilium; 67, ischium; 68, os pubis; 69, hip-joint.

LIMBS.

70, shoulder bone; 71, point of shoulder; 72, upper arm bone; 73, elbow-bone (*ulna*); 74, fore-arm bone or radius; 75, elbow-joint; 76, fore-knee-joint, consisting of—77, uniform bone; 78, polygonal bone; 79, lunar; 80, scaphoid; 81, semi-lunar bone; 82, magnum; 83, metacarpal; 84, rudimentary sphenoid bones; 85, sesamoid bones; 86, pastern bones; 87, coronet bones; 88, hoof-bones; 89, navicular bone; 90, femur (thigh bone); 91, tibia; 92, patella; 93, stifle-joint; 94, hock. This comprises—95, os calcis (heel-bone); 96, astragalus; 97, scapho-cuboid; 98, the first cuneiform bone; 99, the second and third cuneiform bones. From the hock downwards, the bones are the same as on the fore limbs.

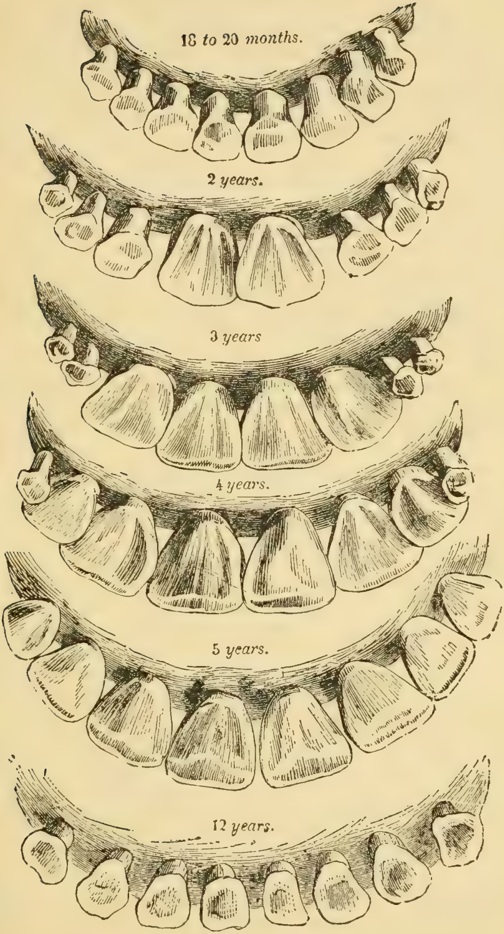

FIG. 7.—CATTLE DENTITION.

Historical Sketches of Breeds of Cattle mainly valued for Beef Production, together with their Characteristic Points and Qualities. (See pages 56-59.)

The Shorthorn is the most widely distributed and the most numerously represented of all varieties of British cattle, not only in the United Kingdom and her colonies but also in the United States of America and in Argentina, where, as in France, it goes by its older name of the "Durham." One of the best of its numerous good qualities is a marvellous power of adaptation to varying climatic and other conditions. The breed is further peculiar in that it contains a considerable variety of types, certain strains having been bred almost exclusively for beef, while with others the aim has been a dual-purpose or dairy animal. The following special breed characteristics are worthy of notice.

The accepted colours of the breed, which is also designated the "red white and roan," are red, roans of various shades, red and white, and wholly white. Fashions in the matter of colour change from time to time. White was rather unpopular for many years, but is now admitted to be a good colour. Rich dark roan, however, is generally regarded as the best. Light or yellowish-red, red and white (where there is much white) and patchy roans are out of fashion at present. Brindle, black, dun, and yellow do not now occur in the breed. The skin, including the inner ears, is of a creamy white or yellow colour. The nose, palate, lips and eyelids should be flesh-coloured and free from dark markings or cloudiness. A white nose is indicative of delicacy, and a black is objected to probably on the ground that it indicates impurity of blood, although many good and perfectly pure-bred Shorthorns both in early and recent times have been dark nosed. "Foljambe," a famous early sire and a descendant of the noted bull "Hubback," had, on the authority of Bates, a dark nose. The defect seems to have turned up most frequently when distinct strains have been intermingled.

The characteristic horns are short and blunt, curved forward and slightly downward, and preferably of a waxy yellow throughout, without dark tips. They should be laterally flattened (or oval in section) and set on fairly wide apart. Horns are stronger and less curved in the male. The hind quarters have a characteristic squareness, as contrasted with the rounder outline of, say, the Aberdeen-Angus or the Hereford. The hooks, too, tend to be wider than in the latter breeds, though excessive width is regarded as a fault. In size, the Shorthorn probably stands second (to the South Devon) among British breeds.

Shorthorns are descended from the old North-East of England breed, variously designated the "Durham," "Teeswater," "Yorkshire," or "Holderness." The cattle of this district had as early as the beginning of the eighteenth century a very high reputation for general usefulness. In 1744, for example, William Ellis wrote[1]: "I think of all the cows in England none come up to the Holderness breed for their wide bags, short horns, and large bodies, which render them, whether black or red, the most profitable beasts for the dairyman, grazier, or butcher. Some of them have yielded two or three gallons at a meal." Later (in 1785), George Culley in his *Observations on Live Stock*, says they "differ from other breeds in the shortness of their horns and in being wider and thicker in their form or mould, consequently feed to the most weight, in affording a much greater quantity of tallow when fattened, in having very thin hides, and very much less hair upon them than any other breed (Alderneys excepted); but the most essential difference consists in the quantity of milk they give beyond any other breed. . . . Their colours are much varied; but the generality are red and white mixed, or what the breeders call 'flecked,' and when properly mixed is a very pleasing and agreeable colour."

It is clear that the breed in those days was what we should call a dual-purpose one, for scarcely any of the early describers fail to extol both its fattening and dairy qualities. Compared with the modern Shorthorn these cattle were doubtless tall and ungainly and slow in reaching maturity, although they excelled their contemporaries in feeding qualities. The preponderance of light or yellowish-red and of white "flecking" among the various colours constitutes another difference from the modern breed, in which dark reds, rich roans, and whites are predominant. The first "Duchess" is described as a "massive, short-legged animal of a beautiful yellow-red flecked colour." "Hubback," too, was "yellow-red and white." The yellowish tint seems to have been more or less correlated with the good milking qualities possessed by the early Shorthorn, and to have disappeared with the modern tendency towards a more purely beef type. The fact that the light red non-pedigree Shorthorn cow with a slightly orange tinge is, as a rule, more highly appreciated by dairymen than the dark-red, tends to support this view.

Such then was the **type of the Teeswater or early Shorthorn** before the time of the great improvers. How it originated we shall never exactly know, for there is very little real historical evidence available on the point. It seems tolerably certain, however, that is was produced largely by the use of imported Dutch bulls on the cows which were native to the district in the sixteenth and seventeenth centuries. It was probably from these imported Dutch cattle that the early Shorthorn derived its most distinctive characteristics, large size, short horns, broken colour, and fine dairy qualities. Culley, in his book, calls the breed "The Short-horned or Dutch kind," and gives reasons for his belief in its continental origin; it is probable, however, that his view is rather extreme, and fails to take account of the influence of the older native stock. In any case, the introduction of Dutch blood appears to have ceased about the middle of the eighteenth century, and since that date the improvement of the breed has been brought about practically within itself. A slight infusion of Galloway blood was indeed introduced in the "Alloy" strain of Charles Colling, who used in his herd the bull "Grandson of Bolingbroke" produced by two crosses of Shorthorn on a selected red Galloway cow. Two cows, "Lady" and "Daisy," got by this bull carried the Alloy strain into several families of Shorthorns, but the distinct Galloway characteristics rapidly disappeared in the full flood of Shorthorn blood, and the whole incident, rightly regarded, is quite insignificant, except for the appearance of the Polled Shorthorn in America.

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[1] *The Modern Husbandman*, by William Ellis of Little Gaddesden, 1746.

Pedigree records within the breed have been accurately kept since 1822, when the *Coates's Herd Book* was commenced. Breeding records of the better bulls, more or less imperfect, stretch back for about half a century before this time, but "very few pedigrees can be traced by names on the female side beyond the year 1780, and but comparatively few beyond 1800."—SANDERS.

The home of the improved Shorthorn, the district in which almost all the great early breeders worked, is that of Teeswater, or, more narrowly, the country within a ten or fifteen miles' radius of the town of Darlington. "When you reach that fine country on both sides of the River Tees," says Culley, "you are then in the centre of this breed of cattle."

Charles and Robert Colling[1] of Ketton Hall and Brampton, near Darlington, were the greatest of the early improvers, though it is a somewhat misleading description to call them "the founders of the Shorthorn breed of cattle." Earlier breeders, in particular the Aislabys, Michael Dobinson, and John Maynard, deserve to be remembered for their valuable work. The Collings, who commenced farming in 1782 and 1783 respectively, did very much to improve the quality and extend the fame of what had hitherto been a local breed.

[1] Charles, the greater though the younger brother, 1750-1836; Robert, 1749-1820.

Their methods were modelled on those of Bakewell,[1] whose epoch-making work with the Leicester sheep and the Longhorn had rendered him famous at about this time. Both brothers, in fact, paid prolonged visits to Bakewell, made a close study of his system, and returned with the determination to apply it to their native cattle. The system, of course, was based on rigorous selection and very close in-and-in breeding of the selected strains. Although neither brother was endowed with the boldness or the originality of Bakewell, the pupils were infinitely happier than he in their choice of foundation stock, and what they actually accomplished eclipsed the results obtained by the master with the rival breed.

The brothers, though admittedly excellent judges and managers of stock, yet owe, in a great measure, their success and the name they have handed down to posterity to their methods of bringing their animals to the notice of the public. Two famous beasts—the "Durham Ox" born in 1796,[2] with a live-weight of 1½ tons, and the "White Heifer that Travelled," a free-martin born in 1806 which scaled over a ton—were carried about the country and exhibited as specimens of the wonderful breed with which the name of Colling became familiarly associated.[3] In spite of the enormous size of these individuals the Collings, conforming to the practice of Bakewell, seem to have regarded size as a subordinate consideration, and to have directed special attention to utility and beauty of form and to the development of early maturity and flesh production.

The **improvement effected** by the Collings was very marked. Low says (1845): "The Durham, or improved Teeswater breed, differs nearly as much from the older cattle of the Tees, as the Dishley breed of Longhorns from the older race from which it was derived. The height is less, but the trunk is more round and deep, the limbs are shorter in proportion to the depth of body; and the chest, back, and loin more broad, so that with less apparent bulk of body the weight is usually greater. The skin is light coloured, and the hair reddish brown or white, either separate or mixed. The muzzle is flesh-coloured and rarely black; and the appearance of black on the skin indicates the revival of a character of the older varieties, which modern breeders study to exclude. The horns are shorter than in the former breed, light coloured, and sometimes laterally flattened.

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[1] Robert Bakewell, of Dishley, Leicestershire, 1725-1795.

[2] By "Favourite" out of a common black-and-white cow bought for £14 at Durham fair. He dressed 165 st. 12 lb. of beef from a total dead-weight of 2620 lb., after the loss resulting from two months' suffering from a broken leg.

[3] John Day bought the ox for £250 and travelled with him nearly six years through England and Scotland.

The skin is soft to the touch, the general form square and massive, the shoulder upright and the hind-quarters large. . . . Although Colling preferred cattle of a medium size, yet, the breed being derived from one of great bulk of body, there is a constant tendency to the production of large animals. The breed communicates its characters readily to all others, and the first progeny, even with races the most dissimilar, is usually fine. The female retains in a considerable degree the properties of the Holstein race in yielding a large quantity of milk. . . . In this respect, however, the new breed is inferior to the older and less cultivated one, showing that refinement in breeding, and the greater tendency to produce fat, are unfavourable to the secretion of milk."

It has already been said that the Collings adopted a system of close in-and-in breeding, and in this they were followed by most of the distinguished early breeders. The pedigree, for example, of Charles Colling's bull "Comet," which brought the then unheard-of price of 1000 guineas at the dispersion in 1810, is given thus:—Sire "Favourite" (252) dam "Young Phœnix" by "Favourite" (252) Gr. dam Phœnix, the dam of "Favourite," "Favourite" himself being the progeny of half-brother and sister.[1] Though in-and-in breeding has admittedly done much to raise the standard of the Shorthorn breed, there is a strong presumption that close breeding of itself, apart altogether from its tendency in this case to promote the development of flesh, has to do with the acknowledged lowering of the power of milk production. It is a well-established fact that persistent in-breeding leads to impotency in the matter of conception, and while Shorthorns as a whole are not so liable to suffer in this way as some other classes of stock, yet the difficulty has often occurred when in-breeding has been carried too far. It would be remarkable if the reproductive system were seriously affected as regards its first function, and left in a normal state as regards those of a later period. It has been argued that the Galloway **Alloy** strain was introduced by Charles Colling as a deliberate out-cross when he observed the first ill effects of in-breeding, but we can never know whether this was so. There were several circumstances which made it possible to carry in-breeding to its greatest length in the early Shorthorn with a minimum of bad results. The foundation stock was of mixed origin and

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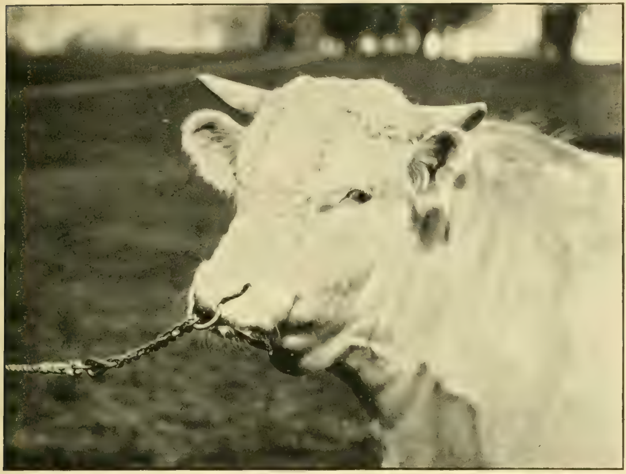
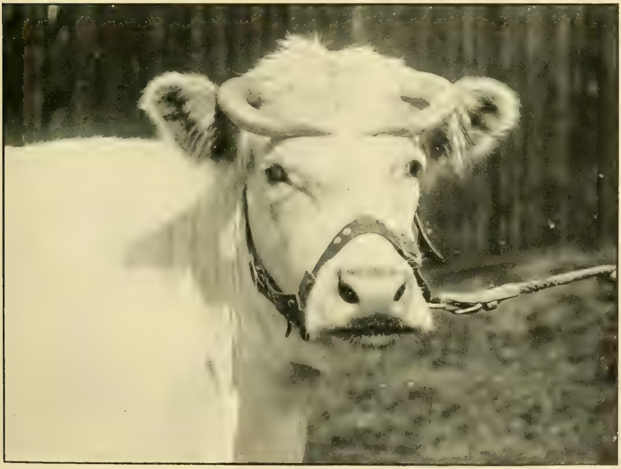
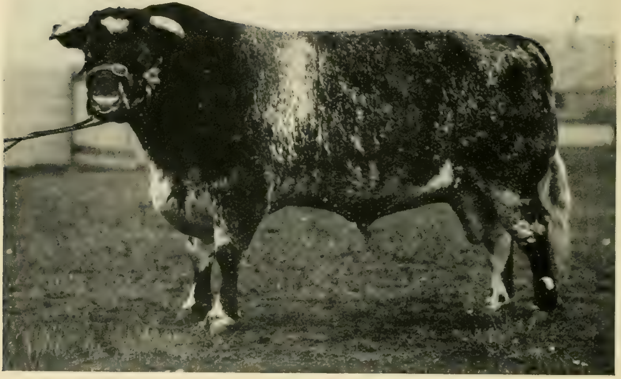
[1] "Caithness," writing in the *Scottish Farmer*, January 15th, 1921, states that he has a list of the sale of Shorthorn cattle held in Durham in 1810. One bull sold for 1000 guineas; another for 365; and cows were disposed of at prices as high as 410. A bull calf went at 170; another at 140; and heifer calves sold at prices as high as 105 guineas. It is interesting to compare these with to-day's prices, considering the value of money then and now.



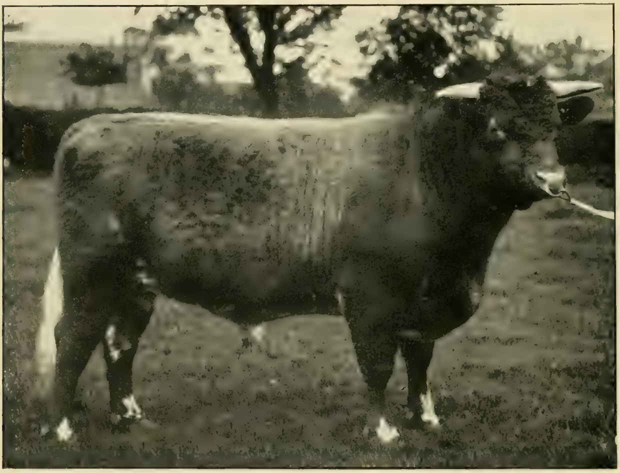
A. Head of Typical Two-Year-Old Shorthorn Bull, "Meteor.
Owned by the late Sir R. P. Cooper, Bart., Lichfield.



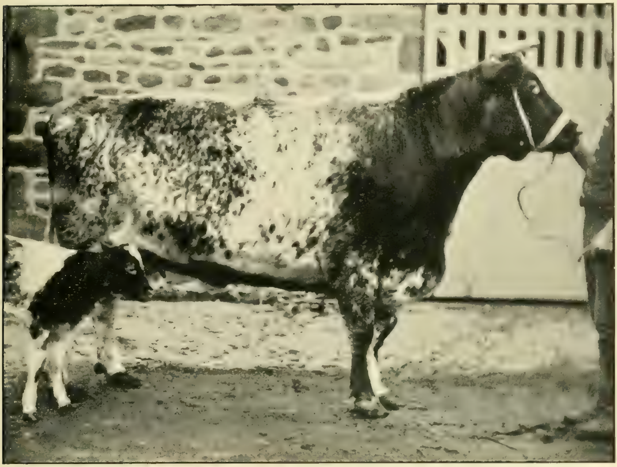
B. Head of Shorthorn Cow, Typical for the inward set of horns, "White Heather.'
Owned by J. Deane Willis, Bapton Manor, Wiltshire.
[*Both by G. H. Parsons, Alsager, Cheshire.*



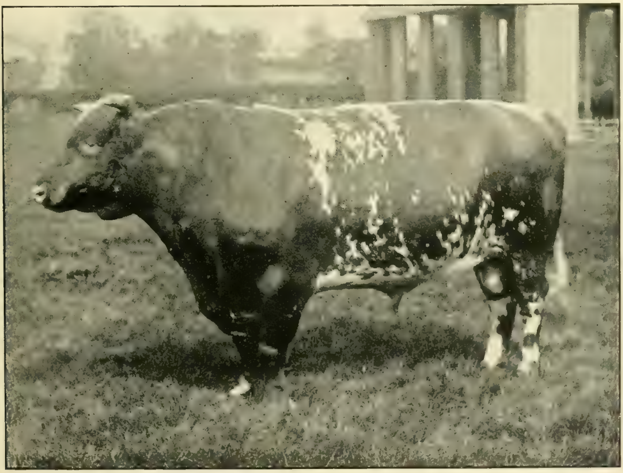
A. SHORTHORN BULL, "PELLIPAR IRIS." 3 years 5 months.
Owned by A. J. Marshall. Champion at Highland Show, Dumfries, 1922.
[*"Agricultural Gazette Photograph.*



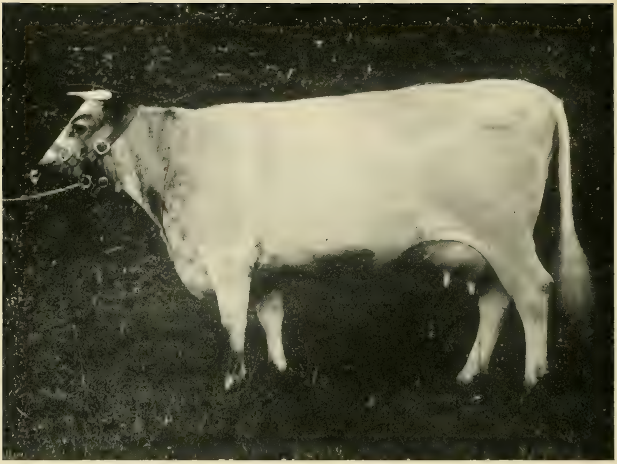
B. SHORTHORN BULL, "RUDDINGTON PRINCE CHRISTIAN" (89997).
Sold at Ruddington Hall for 1100 guineas.
[*G. H. Parsons, Alsager, Cheshire.*



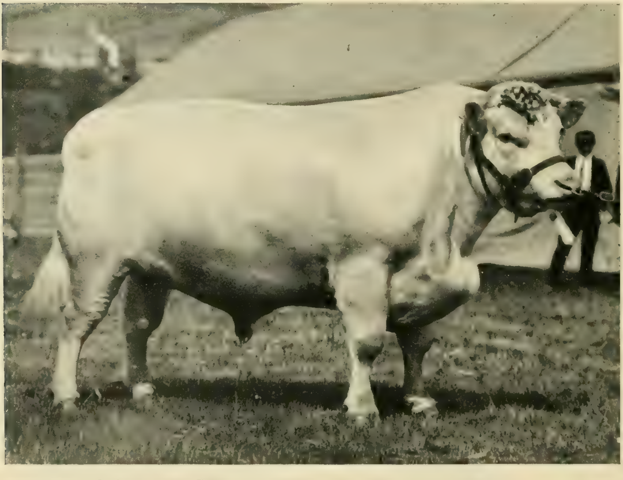
A. TYPICAL BOOTH SHORTHORN COW AND CALF.
Owned by T. H. Hutchinson, The Manor House, Catterick.
[*J. Ramsden, Richmond, Yorks.*



B. SHORTHORN BULL, "ROYAL STUART" (40646).
Bred by T. C. Booth of Warlaby, Northallerton.

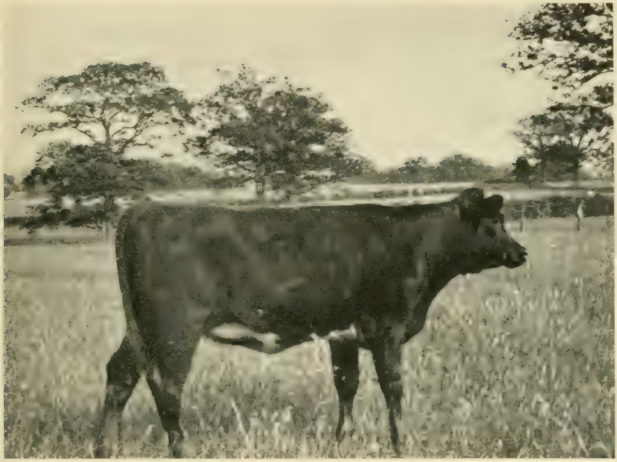


A. Booth Shorthorn Cow, "Lady Aline Studley," at 7 years
(d. of "Royal Renown"; first yearling bull, "Park Royal," 1905).
The property of the late Duke of Northumberland.

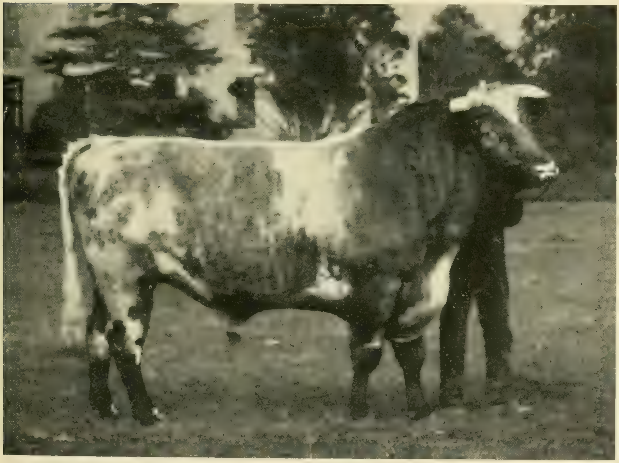


B. Shorthorn Bull, "Tongswood Bequest." Born March 1919.
Owned by C. E. Gunther, Kent. Champion at Plymouth.
[*"Agricultural Gazette Photograph."*

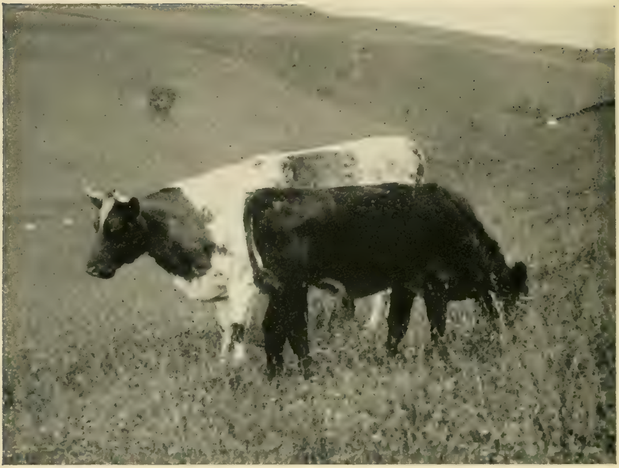
PLATE XIII.



A. Old English Heifer, "Felbridge Czarina," traces back to Old Mason blood.
High dual-purpose merit and exceptional heavy milking ancestry.
Bred and owned by Dr Mollison and P. Morgan, East Grinstead.

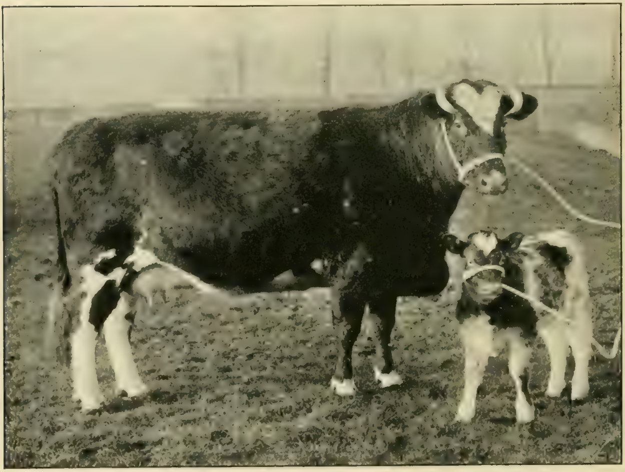


B. Bates Shorthorn Bull, "Earl of Oxford 3rd" (51186).
Calved 1884. He was the property of Henry Sharpley.



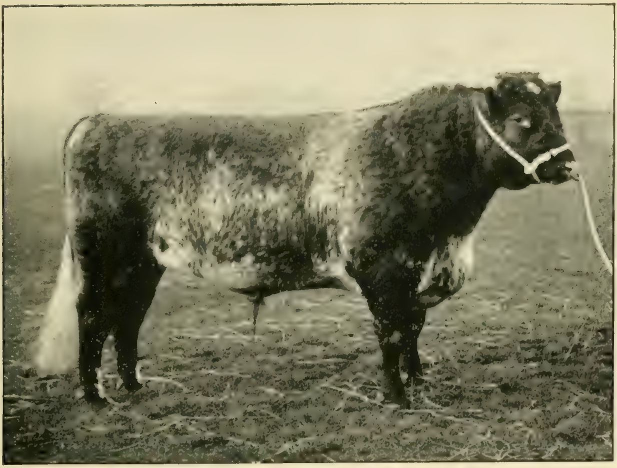
A. Shorthorn, Cumberland Dairy Cow. With her blue-grey Calf by a white Shorthorn Bull. Four previous Calves were by a Galloway Bull. Owned by John Elliot, Meigle, Selkirkshire.
Telegony or Imagination—which?

[*Photo by the Author.*

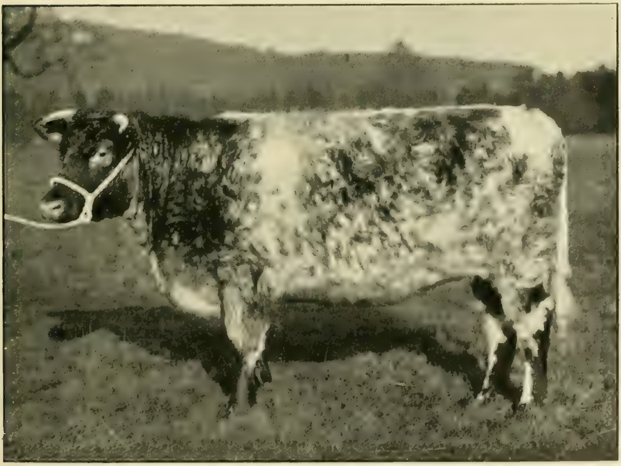


B. Shorthorn Cow, "Lady Charlotte," and Calf, "Lady Courtly."
Owned by the late Philo L. Mills, Ruddington Hall, Nottingham.

[*C. Reid, Wishaw.*

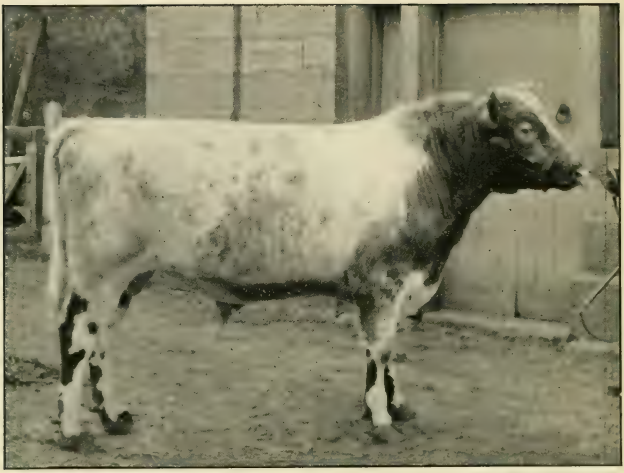


A. SHORTHORN BULL, "KING CHRISTIAN OF DENMARK" (86316).
Of the Townley-Farewell family (three crosses of Cruickshank on Bates blood).
Champion and Challenge Cup winner at Grimsby, 1904, etc. etc.

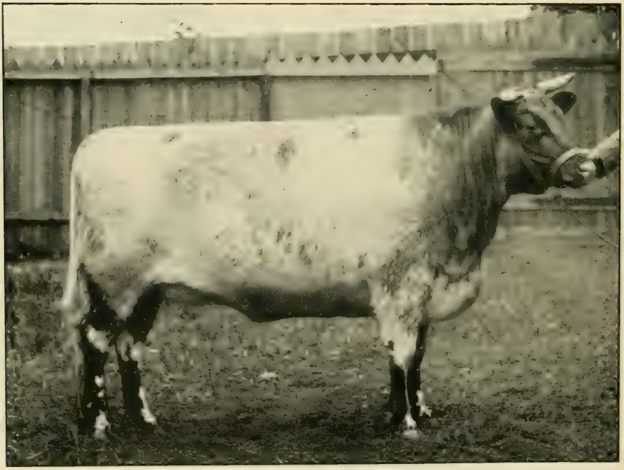


B. SHORTHORN (SCOTTISH) HEIFER, "LADY BROADHOOKS 3RD."
Champion at Oxford Show, 1904, etc. etc.
Both owned by the late Philo L. Mills, Ruddington Hall, Nottingham.
[*Both by C. Reid, Wishaw.*

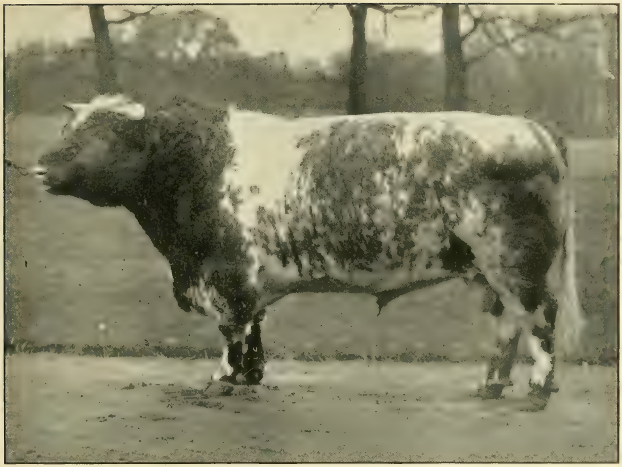
PLATE XVI.



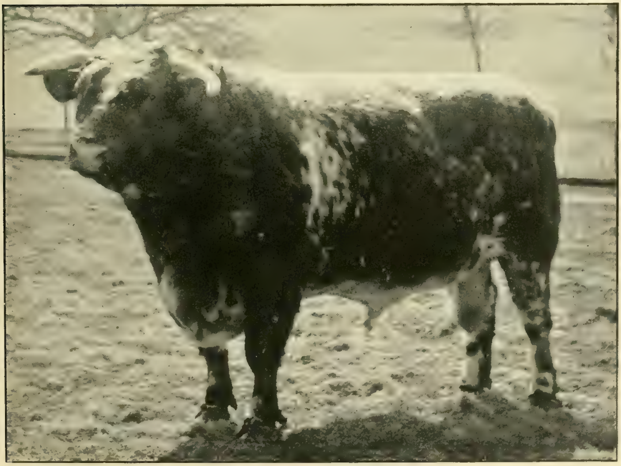
A. SHORTHORN BULL, "ROYAL DALESMAN" (66193) (MILKING TYPE).
Bought by the late Major Barton, Straffan, Co. Dublin, for 150 guineas, at Alnwick Park Sale, 1894.
[*J. Robson, Alnwick.*



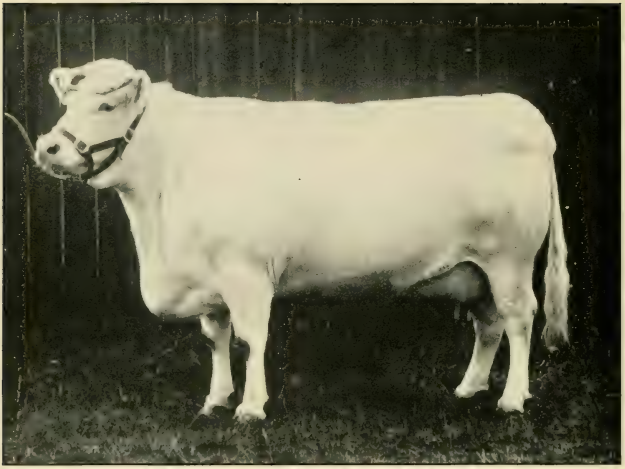
B. SHORTHORN HEIFER, "FLORA 6TH."
Sixteen times Champion (including the Royal and Highland Shows), and thirty-seven times 1st prize in 1902-3. Owner, Geo. Harrison, Gainford Hall, Darlington.
[*G. H. Parsons, Alsager, Cheshire.*



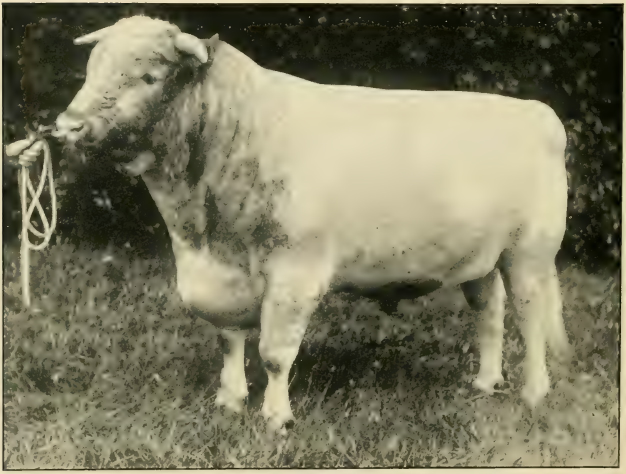
A. SHORTHORN BULL, "FIELD MARSHAL" (47870).
"The grandest of the latter-day Cruickshank bulls."
Used in the Windsor Herd of her late Most Gracious Majesty Queen Victoria.
[*G. P. Garland, Windsor.*



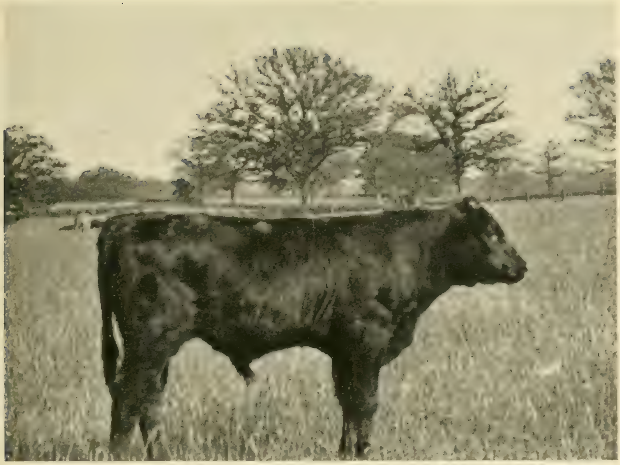
B. SHORTHORN BULL, "STAR OF MORNING" (58189).
Bred by W. Duthie, Collynie, N.B. Bought by the late A. M. Gordon of Newton, N.B.



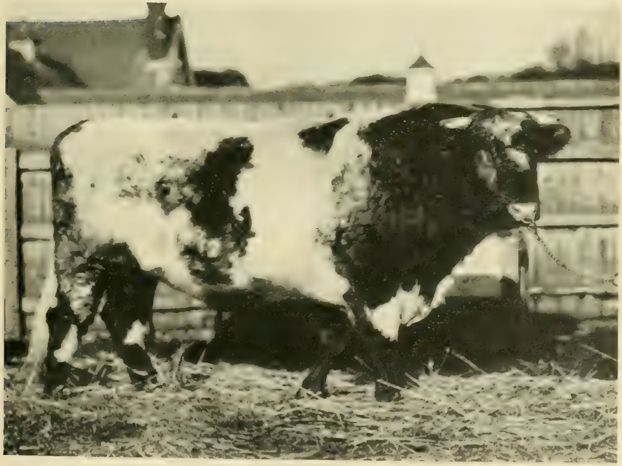
A. Shorthorn Cow, "White Heather." Born 1896.
Four times First, and twice Champion, R.A.S.E., winning over £1000 in prizes.
Bred by J. B. Manson, s. "Merry Mason," d. "Beauty XXIV."
Owner, J. Deane Willis, Bapton Manor, Codford St Mary, Wiltshire.
[*G. H. Parsons, Alsager, Cheshire.*



B. Shorthorn Bull, "Mario" (51713).
Champion, R.A.S.E. Show, 1888. Bred by W. Duthie, Collynie, Aberdeenshire.
[*J. Laing & Co., Insch.*

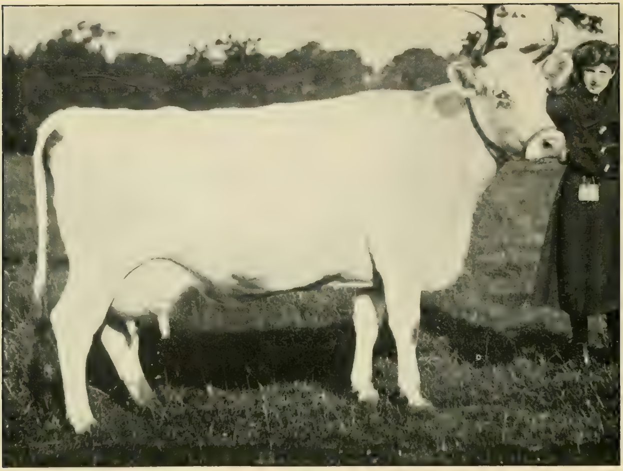


A. OLD ENGLISH SHORTHORN BULL, "FELBRIDGE RUFUS," of dual-purpose "Soraphina" blood which produced "Heir of Englishman" (24122). First in 1922 at two Country Shows. Bred and owned by Dr Mollison and P. Morgan, East Grinstead.

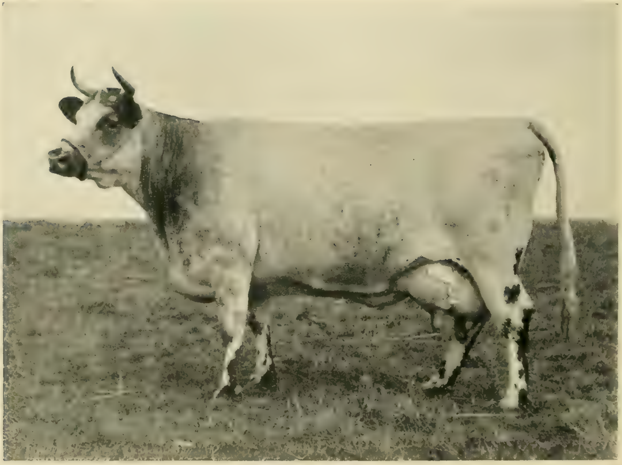


B. DAIRY SHORTHORN BULL, "DAUNTLESS DUKE 2ND" (136092). Sire of 2000 galloners. Owned by J. Timberlakes, Hastoe, Tring.

PLATE XX.

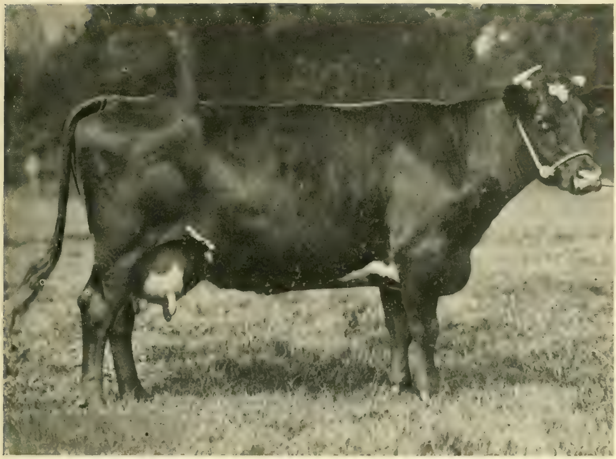


A. Shorthorn Pedigreed Dairy Cow, "Comely Lass."
Won the Shorthorn Society £10 Dairy Prize, Cheshire Show, 1904.
Owner, Sidney Ford, Rose Free Farm, Barthomley, Cheshire.

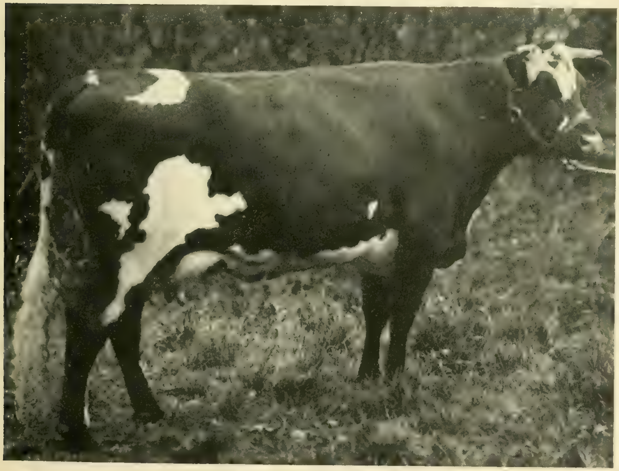


B. Shorthorn Non-Pedigreed Dairy Cow, "Dot."
Many prizes, including £50 Cup, Royal Lancashire Show, in 1904 and 1905.
Owned by S. S. Raingill, Altrincham.

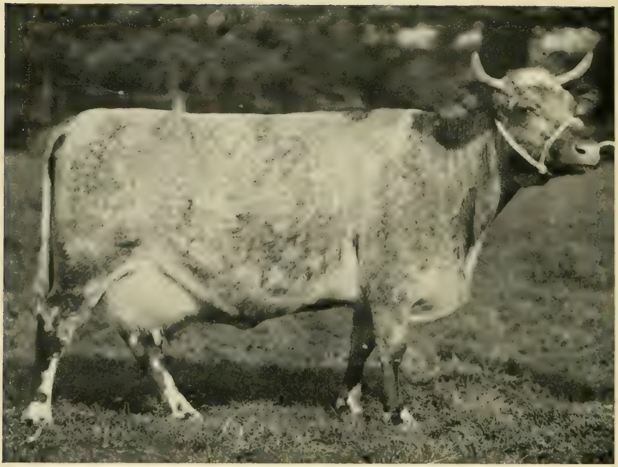
PLATE XXI.



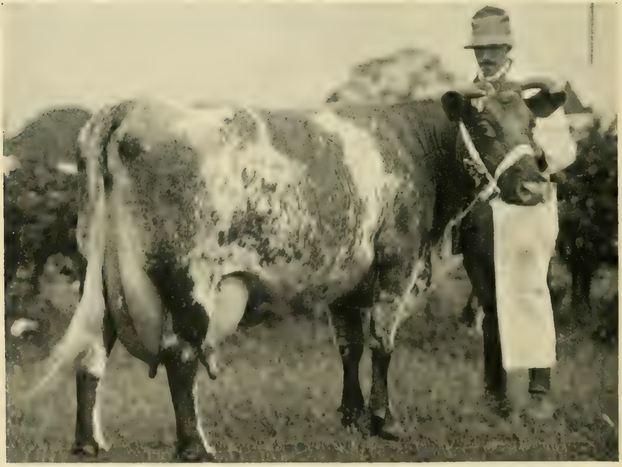
A. Dairy Shorthorn Cow, "Lady," the first 2000 gallon Shorthorn.
Owned by W. Ewings.
[" *Agricultural Gazette Photograph*."



B. Dairy Shorthorn Cow, "Wild Queen 35."
Winner of many prizes.
Owned by Chivers & Sons, Cambridge.
[" *Agricultural Gazette Photograph*.

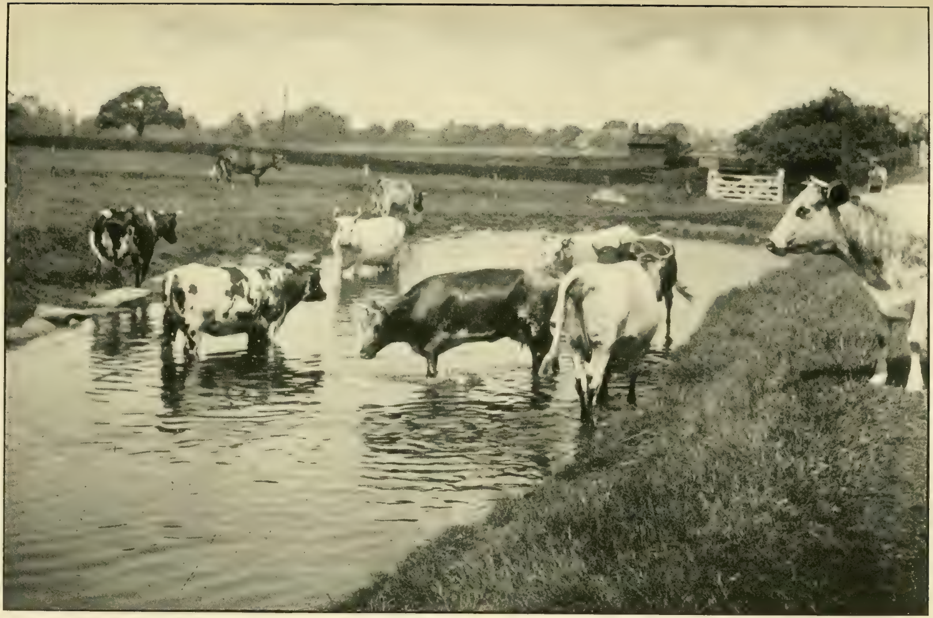


A. Dairy Shorthorn Cow, "Helpmate 18a.'
A 1000 galloner and prize-winner in 1921.
[" *Agricultural Gazette Photograph.*



B. Dairy Shorthorn Cow, "Fair Rosamond."
Champion Milking Trials at Cambridge Royal, 1922. Milk 70 lb. 8 oz.
Butter-fat 3·92 p. Total points 86·18.
[" *Agricultural Gazette Photograph.*"

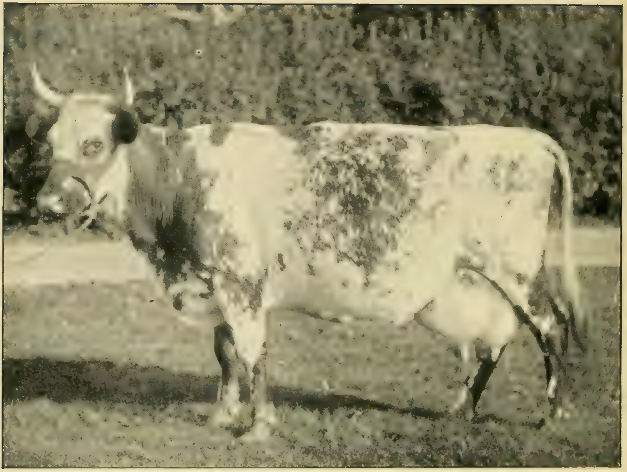
PLATE XXIII.



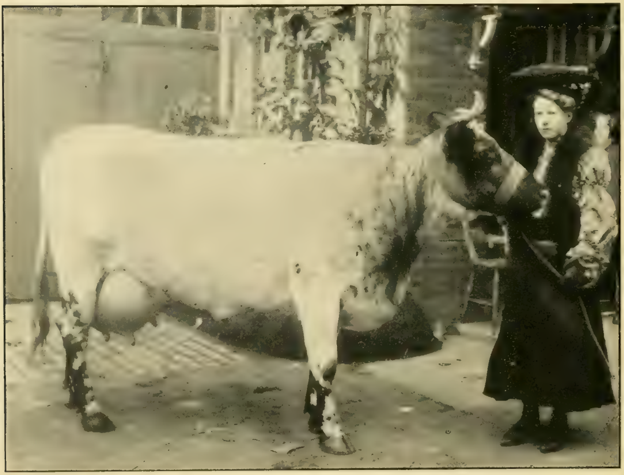
Cheshire Dairy Cattle.
Owned by T. Cotton, Hole House, Alsager.

[G. H. Parsons, Alsager, Cheshire.

PLATE XXIV.



A. SHORTHORN-AYRSHIRE (1ST CROSS), "LADY."
First for butter at Tring in 1901; yield 3 lb. 6 oz. in 24 hours; 2nd for 60 lb. of milk.



B. SHORTHORN-AYRSHIRE (2ND CROSS), "POLLY 2ND," DAUGHTER OF "LADY."
In 1905, 1st in milk and inspection classes at Suffolk Show, and reserved for the Lord Mayor's Cup at the Dairy Show; yield, 5½ gallons of milk 70 days after calving.
Both bred and owned by Wm. Nisbet (then) Bendyshe, Radwater, Essex.

[*C. Reid, Wishaw.*

mixed type, large and wanting in refinement. The animals were kept in moderate condition and in a natural state, their food being mostly grass in summer and hay, straw, and latterly, roots in winter. The system which prevailed of letting out bulls on hire may also have lent renewed vigour of constitution through change of air, food, and general surroundings. Numbers of highly-bred barren cattle, exported to America at low prices, have been found to conceive without difficulty after the change.

Of the individual **animals owned by the Collings** it is worth while to mention a few of the more famous, for their blood runs in the veins of many of our present-day cattle. One of the earliest and most fortunate acquisitions was "Hubback," a small yellow-red and white bull, bred about 1777 by John Hunter of Hurworth and purchased by Robert Colling and one Waistell, another breeder, for 8 guineas. He was later acquired by Charles Colling. There is some doubt about the details of "Hubback's" pedigree, which is given in a very confused form in the *Herd Book* but he was descended from "Studley Bull" and was from carefully-bred Shorthorn stock on both sides. "Hubback" had a marked power of stamping his special characteristics upon his offspring, and, moreover, showed certain qualities, now highly appreciated in Shorthorns, which were not prominent features of the breed before his time, viz., low legs, compact form, and moderate size; a wonderful aptitude for laying on flesh, which he seemed to have inherited from his dam; and, to the touch, a superior quality of skin and hair. His stock had a reputation for "capacious chests, prominent bosoms, thick, mossy coats, mellow skins, with a great deal of fine flesh spread evenly over the whole carcase." From him the improved Shorthorn breed may be said to branch out.

The bull which Charles Colling himself believed to have done him the greatest amount of good was "Foljambe," the produce of a daughter of "Hubback," and described as a "useful thick beast, handle good." He became the sire of the bull "Bolingbroke" and the cow "Phœnix" which, mated together, produced the famous "Favourite" (252), which was so intensively used in the Colling herds. "Favourite," calved in 1793 or 1794, is described by Bates as "a large massive animal with remarkably good loins and long level hind-quarters; his shoulder points stood wide and were somewhat coarse and stood forward into his neck, and he was a powerful animal of good constitution." "Favourite's" most famous son "Comet" was in use at Ketton during the last three or four years of the herd.

The **influence of the Colling herds** was great and widespread. In accordance with the habit of the time, a considerable number of bulls were hired out annually from the two herds. The sales too, Ketton in 1810 and Brampton in 1818 and 1820, were attended by a great number of breeders and the stock was widely dispersed. These sales in themselves were sufficiently remarkable to spread the fame of the breed throughout the country generally.

The **two great branches** of the Shorthorn breed which originally possessed the highest order of merit, the **Booth** and the **Bates**,[1] had common ancestors in the Colling herds. The respective types evolved by these breeders differed considerably from each other; the majority of Shorthorn breeders were supporters of the one type or the other, and a forty years' controversy raged between the two camps.

The **name of Booth** has been associated with the breeding of Shorthorns since before 1790 in the person and in the descendants of Thomas Booth, of Killerby, the father of Richard and of John Booth, and through the latter grandfather to Thomas C. Booth of Warlaby, Northallerton, and great-grandfather of Richard Booth (the second). It was not till some time after the end of the Collings' career that the name assumed the importance it ultimately attained in the Shorthorn world. Killerby, Warlaby, and in earlier times Studley, were the centres from which the various members of the Booth family distributed near and far their surplus stock. The Booths, like the Collings, continued Bakewell's system of in-and-in breeding, and also that of letting bulls out on hire for a season or more, according to contract, to distant parts of the British Isles. This practice has been acknowledged to be of much advantage when the system of close-breeding is adopted; and it also gives a breeder a chance of keeping for his own use bulls that on maturing develop qualities they do not show at the early age at which they are usually sold.

Thomas Booth, the originator of the Booth group of Shorthorns, made one essential difference in his practices as compared with Bates and some other earlier improvers. He selected the best types of ordinary non-pedigree Shorthorn cows, which he found in Darlington market, to mate with his moderate-sized, strongly bred Colling bulls of "Hubback" descent. They were described as "fine cattle; good dairy cows, and great grazers when dry; somewhat incompact in form and steerish in appearance,,but of very robust constitution." He put "substance ahead of points of less practical importance, and from the first regarded flesh-making capacity and breadth of back and loin of more value than a persistent flow of milk." Richard Booth, who leased Studley in 1814, declared that "four crosses of really first-rate bulls of sterling blood upon a good market cow of the ordinary Shorthorn breed should suffice for the production of an animal with all the characteristics of the high-caste Shorthorn."

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[1] Though not here dealt with in detail, there are other important branches of Shorthorn blood in the United Kingdom; for example, Colling families exist which neither Booth nor Bates ever possessed. There are also the Wilkinson Shorthorns, well known in Scotland; the highly appreciated Mason families; the Knightley strains, famous for their milking qualities; and others which will be mentioned later.

Admirable judgment akin to genius, was displayed in mating the various units of the herd to secure the ideal which Thos. Booth, like every other successful breeder, aimed at. Defects were gradually eliminated and desirable characteristics established. Uniformity of type came with the later concentration of blood by the use of home-bred bulls. The breeding animals were fed in an ordinary way at pasture in its season, and on natural hay during the winter months. The herd was kept well before the public by numerous prizes taken at public shows. At that time the wasteful methods of overfeeding show and sale cattle did not drain, as it does now, too much of the best female blood from the stocks of successful exhibitors, and endanger or weaken the breeding power of many of the males. The Colling bulls he used at first demonstrated the fact among Booth cattle that strongly-bred sires often get their best stock from cows not bred "in line." The Booths maintained that they got their best results by "interbreeding with their own established tribes"; their in-breeding at a more advanced stage in the history of the breed than that of the Collings being fraught with greater danger and demanding greater caution.

The following are the names of a few of the most celebrated of the **families of Booth Shorthorns**:—The Anna, Christon, Bliss, Red Rose, Blossom, Bright Eyes, Strawberry, Bracelet, Isabella, Farewell, Broughton, Charity, and Dairymaid or Moss Rose.

The unsurpassed **showyard career** of the Booth cattle at the Royal and other leading shows began under John and Richard Booth, and lasted for many years, until it became a serious drain upon the best blood of the type through the overfeeding that took place in training for shows, to the injury of the breeding-power of many of the best animals, and led to the extinction of some of the leading tribes, *e.g.*, the Blossoms and the Charities.

"Bracelet" was the most distinguished of the early Booth females—being famous as a prize-winner and also as a breeder of high-class stock. She was the dam of three famous and now historic animals—"Birthday" by "Lord Stanley" (4269), and the two prize bulls, "Hamlet" (8126) by "Leonard" (4210), and "Buckingham" (3239) by "Mussulman" (4525). It was through "Buckingham" that the Booth section of the Cherry blood came into the herd. The greatest of all the

Warlaby bulls, "Crown Prince" (10087), was descended from "Buckingham."

John Booth (died in 1857) practically retired from active participation in breeding Shorthorns in 1852, when the first Killerby dispersal sale took place.[1] It came at a depressed time for agriculture, and, although it was attended by many breeders, the forty-four lots averaged but £48, 12s.

Under **Richard Booth** at Warlaby (formerly of Studley), the Booth strain gained its greatest excellence and highest reputation, and developed a great trade in the hiring of bulls to all parts of Great Britain and Ireland. Although Bates cattle were more favoured abroad, they did not appear much in public at home, and Booth had it practically all his own way at the leading shows of this country. The most **perfectly finished female**, typical of many of his grand, thick-fleshed cattle, is described as follows by **Carr**[2]:—

> "Of 'Charity,' who so long graced the Warlaby pastures, it is sufficient to say that she was the personification of all that is beautiful in Shorthorn shape. Such was her regularity of form that a straight wand laid along her side, longitudinally, from the lower flank to the forearm, and from the hips to the upper part of the shoulder-blades, touched at almost every point; her quarters were so broad, her crops and shoulders so full, her ribs so boldly projected, and the space between them and the well-cushioned hips so arched over with flesh as to form a continuous line. 'Charity' won every prize for which she was shown save one, when she was beaten as a calf by another of the same herd, after which her career was one of unvaried success. She was thrice decked with the white rosette at the Royal and thrice at the Yorkshire meetings."

The famous stock bull "Crown Prince," already mentioned, was a son of "Charity," and was primarily responsible for the high degree of excellence attained by Booth cattle.

Richard Booth died in 1864, aged 76, and the Warlaby herd, for which £15,000 had been offered, passed to his nephew, T. C. Booth, who upheld its reputation, and through "Commander-in-Chief" (21451), extended its fame internationally.

Thomas Bates (1775 to 1849) of Kirklevington[3] (1830), in the Vale of Cleveland, began about 1800 his extraordinary career as a Shorthorn breeder, which lasted for half a century. He procured the progenitors of his best cattle from the Collings.

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[1] The Second Killerby herd was sold off in October 1886, after the death of its owner, J. B. Booth; and we may be excused for adding, from personal experience, in a hurricane of wind and rain.—R. W.

[2] William Carr, *History of the Killerby, Studley, and Warlaby Shorthorns*, Ridgway, 1867.

[3] See *Thos. Bates and the Kirklevington Shorthorns*, by Cadwallader John Bates, 1897, Robert Redpath, Newcastle-upon-Tyne; and *The History of Improved Shorthorn Cattle, from the Notes of the late Thomas Bates*, by Thomas Bell, *N.E. Farmer* Office, Newcastle-upon-Tyne.

He was a man of means, and had an education superior to that of his farmer neighbours.

In 1810, after occupying for nine years Halton Castle Farm, a mile north-east of Aydon Castle, he became, at the age of thirty-five, for two years a student of Edinburgh University, with the object, says one record, of going in for the Church. He studied Moral Philosophy, and attended the class of Agriculture under Professor Andrew Coventry (1790-1831), working with great enthusiasm. In his after-career every important detail was made the subject of rigid experiments. Bates possessed many friends, but he was not without enemies, made in some instances by his, at that time, unparalleled world-wide reputation as a breeder of fashionable Shorthorns, but also on account of the assertive, "arrogant" way in which he detailed the merits and sounded the praises of his animals, and backed his own methods and beliefs as if they were infallible. The circumstances were all the more irritating to his rivals because there was such a strong foundation of truth underlying much of what he said. The position arose, in a great measure, on account of his infatuation about the "Duchess" strain, and its asserted monopoly of the pure stream of Shorthorn blood. An unconcealed keenness for success, even to the discomfiture of their neighbours, is not a rare quality among successful prize-winners, and with some modern members of the class it resolves itself at times into a question of money. This could not be said of Bates, as the statement of Cadwallader John Bates is freely admitted, that "the national improvement of Shorthorns as paying farm stock, and not the conversion of his own particular herd into the most money possible, was the unswerving aim of Bates's later life"; and further, it may be said in palliation of his manner, that "a considerable sportive element was mingled in his caustic criticisms of man and beast," and "that his eye had the light of decided genius."

His opinion of his own merits as a judge may be gathered from his assertion that "a hundred men may be found to make a Prime Minister to one fit to judge of the real merits of a Shorthorn."

His name is most familiarly associated with the **Duchess tribe**, for which was claimed all the good qualities, including that of milk production, which the Shorthorn breed possessed.

The original Bates "Duchess" by "Daisy Bull" (186), bought in calf to "Favourite" for 100 guineas, from Chas. Colling in 1804, was "a deep, rich milker, making as high as 14 lb. of butter per week, and when fed off at seventeen years of age she is said to have made an excellent carcase of beef."

She was grand-dam to "Duchess 1st," the nominal origin of this Bates family—till recently "the highest priced and most widely sought after tribe known in Shorthorn history." It was only when Bates, by intense in-breeding had reduced the power of reproduction in the females to vanishing point that he introduced the **Princess bull** "Belvedere" (1706)—one of a number of successful and historic bulls associated with his name. Many of Bates's choicest Duchesses were sent to the butcher on account of their failure to breed; it is calculated that of fifty-eight Duchesses which had been reared to breeding age up to the time of Bates's death, twenty-four had never borne a calf. By the Princess and Duchess union Bates almost, if not quite, fulfilled his boast that he "would produce Shorthorns such as the world had never seen." Before this time, Sanders says, "the breeding of bulls to their own dams or daughters was a common occurrence" in Bates's practice. Darwin says, "For thirteen years he bred most closely in-and-in; but during the next seventeen years, although he had the most exalted notion of his own stock, he thrice infused fresh blood into his herd; it is said he did this not to improve the form of the animals, but on account of their lessened fertility."

Bates's greatest bull was "Duke of Northumberland" (1940), champion of England in 1839, a roan by "Belvedere" out of a Belvedere cow, and thus a blend of Princess and Duchess blood, in the proportion of three-fourths of the former to one-fourth of the latter. His live-weight at three years and eight months was 2520 lb.

The **Oxford tribe** formed the second most important branch of Bates blood, and the two families were most intimately related through frequent intercrossings by bulls taken from one to the other.

The name "Oxfords" originated out of the conspicuous success obtained at the Oxford show of the Royal Agricultural Society in 1839, where Bates carried off four first prizes with "Duke of Northumberland," two "Duchess" heifers (42nd and 43rd), and what was afterwards known as the "Oxford Premium Cow," which gave the name to the tribe. This last was bred from the historic "Matchem" cow bought as a four-year-old for £15, 10s. She was got by a Mason-bred sire which contributed a share of blood to both the Booth and Bates herds. The two "Cleveland Lads" (3407) and (3408) from the "Matchem Cow" by "Short-tail" were kept as stud bulls, and "constituted the Oxford outcross upon the Duchesses." "Oxford Premium Cow" and "Oxford 2nd" were kept as ancestresses of the tribe. The "Oxford Premium Cow" was beaten by Thos. Booth's "Necklace" at the Highland Society's show at Berwick in 1841, being "deficient in girth and 'gaudy' behind"; but in the following year the honour of Bates was retrieved at York, by "Duchess 34th," the dam of "Duke of Northumberland," carrying 50 per cent. of Princess blood. Bates wrote of her merits:—

"As a proof that they have improved under my care, I may mention that "Duke of Northumberland's" dam consumes one-third less food than my first Duchess, purchased in 1804, and that her milk yields one-third more butter for each quart of milk, while there is also a greater growth of carcase and an increased aptitude to fatten."

It will be recognised from the foregoing references to **consanguinity** that even a more perfect system of in-and-in breeding was followed by Bates than in the case of the Colling or of the Booth cattle. The system, too, was long continued with Bates cattle after the death of Bates himself and the dispersion of the Kirklevington herd.

Other Bates tribes that call for special mention are:—The Waterloos, distinguished for their thick mellow flesh and furry coats, which contributed one female to the herd of Amos Cruickshank when the Bates cattle were dispersed; Wild Eyes, descended from a roan heifer bought in 1832 for £3—the most numerously represented tribe at the dispersal sale; Cambridge (Red) Roses, descended from the Cambridge Royal Premium Rose Cow; the Foggathorpe family, descended from Charles Colling's "White Bull" (151). Some of the Bell-Bates tribes, bred by Bates's tenants from his stock, also acquired fame and brought high prices during the period when Bates cattle were in fashion. The Barringtons, Craggs, and Kirklevingtons belong to these.

At the **Bates sale** in 1850, the year after Bates's death—a very depressed period for British Agriculture—only six families were represented. Fourteen of the "Duchess" tribe sold at an average of £116, 5s.; thirteen "Oxfords" £68, 16s.; twenty-five "Wild Eyes" £48, 2s.; six "Waterloos" £59, 10s.; three "Cambridge Roses" £49; and seven "Foggathorpes" £46, 19s. (See Appendix T—"Record Prices for Live Stock.")

The *Farmers' Magazine* described **Bates cattle** thus:—

"Magnificent size, straight and broad back, arched and well-sprung ribs, wide bosom, snug shoulder, clean neck, light feet, small head, prominent and bright but placid eyes, were features of usefulness and beauty which distinguished this herd in the very highest degree."

The colours of Bates cattle were originally red, red and white, and roan, but "the concentration of the blood of the light-coloured Belvedere and of the white Matchem Cows' sons—the Cleveland Lads—modified the original Duchess colour," so that at the dispersal sale out of sixty-eight animals thirty-eight were roan and five white. Twelve were red and fifteen red and white. The **Stanwick** cow, which was the mother of all the best of the Bates breed, was a yellowish-red roan. Though good milking power has always been considered a point of importance in Bates cattle, the fact that the common non-pedigree Shorthorns surpass them in this particular quality, is probably an indication of the influence of close-breeding on the organs involved in reproduction.

In comparing latter-day Booth with Bates cattle, we find that the Booth breed exhibited a greater number of light-coloured specimens—white, and light roan; a thicker and less silky skin; a more substantial and massive frame, more deeply covered with flesh; the head and neck set on lower, and the style and expression more sombre, than in the case of its stately rival. The best specimens of the Bates bulls possessed a wonderful presence, given by the arched crest and stylish head. The breed was particularly liable to the defect of a hollowness, or falling away, at the heart girth; this was made all the more apparent by the high neck and the frequently perpendicular shoulders. These differences are now mainly of historical interest, as very few, if any, pure specimens of either line exist.

In America, in the early days, the prices paid for Bates cattle were exceptionally high.[1] There, as in our Australian colonies, Bates cattle were at first preferred to Booth, but in recent years Cruickshank cattle have come into high favour as beef-producers at home and abroad.

Shorthorn breeders other than the Collings, the Booths, and Bates were numerous; they reared good cattle, and some of them from time to time supplied animals to the great masters in the art of breeding. Some even took the lead—Mason and Whitaker for example—in the trade of exporting their own and other favourite pure-bred Shorthorns to America. The following is a short list of names of early breeders well known in the history of English Shorthorns:—Dobinson; Christopher Mason of Chilton; Earl Spencer; Wetherell of Aldborough, and his two sons, Wm. of Holme House, Darlington, and John of Field House, Yarmouth; Jonas Whitaker, near Otley, Yorkshire; the Joblings, Northumberland; Millbank of Barningham; Maynard of Eryholme; Watson of Manfield; Appleby of Stanwick; Wm. Torr of Riby, Lincolnshire; John Brown of Nunstainton; Sir Chas. Knightley of Fawsley Park, Daventry; Samuel Wiley of Brandsby, Yorkshire; Fawkes of Farnley Hall, near Otley, Yorkshire; and hundreds of others.

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[1] In Canada in 1879, the Author saw in the possession of the Hon. M. H. Cochrane, Compton, Prov. Quebec, the famous "Duchess" cow, which at that time had (speaking from memory) bred stock that had sold for £27,500, and lived to add £2508 to that figure. At the New York Mills Sale, in 1873, ninety-three cows and heifers averaged £791, 8s., and sixteen bulls averaged £403, 16s., making a total of £80,061, 9s. Fifteen specimens of the Duchess tribe of T. Bates averaged £3679, 18s.

G. E. Collins wrote :—

"**W. Torr**, of Aylesby Manor, was one of the best farmers and one of the greatest breeders of Shorthorns who ever lived in England. He was a born judge, knew good cattle when he saw them, and being entirely free from bigotry and prejudices, founded a herd equal to any in the kingdom. He was a great admirer of Booth cattle, and in the forties considered that John Booth's herd at Killerby, was unquestionably the best small herd in England. The best herd of over 100 head he said he ever saw, belonged to C. Robson, of Cadeby, from whom he bought the founders of his famous M. and G. families. *His own maxim in breeding was* "*cull the worst and never sell the best females*, *no matter how tempting the price.*" When the herd came to be dispersed at Aylesby, on 2nd September 1895, 84 head of cattle were disposed of for £42,919, 16s., and an average of £510, 19s. The sale is a landmark in Shorthorn history and was in its way unique, as every animal offered was bred on the farm by the late owner.

CHAPTER IV

SHORTHORNS—*continued*

Introduction of Shorthorns into Scotland—Early Breeders—Amos Cruickshank—Families of Sittyton Shorthorns—Famous Bulls used—Sittyton Sales—Other Early Scotch Breeders—The Herds of Marr and Duthie—Commingling of Cruickshank Blood with that of Booth and of Bates—Average Prices at Auction Sales—Shorthorn Herd Book Differences—The **Dairy Shorthorn** (**Coates's Herd Book**) **Association**—Milk Records of Shorthorn Herds—Short List of Prominent Shorthorn Breeders—Irish Shorthorn Breeders' Association—**Dexter**-Shorthorns—**Lincoln-Red** Shorthorns—**The Non-Pedigree** Shorthorn—Milk Recording in England—The **Polled Durham** in America.

LOW (1845) says of the introduction of improved Shorthorns, Holsteins or Teeswaters, **into Scotland** early in the nineteenth century:—

> "This highly cultivated breed extended from the district of the Tees, as from a centre, as soon as its value became known. It quickly spread northwards all through Durham and Northumberland into the valley of the Tweed, and, in later years, it had extended northward through the eastern lowlands of Scotland to the Pentland Firth."

The introduction was carried out by two men, who were contemporaries and intimates of the Collings and other early breeders of repute. The first was **Robertson of Ladykirk**, Coldstream, Berwickshire; and following him, came **John Rennie of Phantassie**, in East Lothian. Rennie contracted an interest in and knowledge of Shorthorns as a farm pupil in Berwickshire, and bought his first cattle from Robertson. The foundation stock of both herds was carefully selected on their individual merits from the country cattle, reared in the original home of the Shorthorn, and mated with bulls got from the Collings and other progressive breeders. Neither would record pedigrees in the *Herd Book*, holding that registration would restrict the choice of breeders to a limited number of animals and put a ban upon an immense number of good cattle. The soundness of judgment of these pioneers is not yet fully realised, although, during subsequent times of intense consanguineous breeding and pedigree domination, the value of the descendants of their unregistered cattle suffered in consequence. Rennie had the distinction of having sent the first

Shorthorn bull to the Aberdeenshire region, now acknowledged to be the fountain-head from which the most highly prized specimens of the breed have been derived during recent years.

Captain Barclay of Ury, on the banks of the Cowie, Kincardineshire, "the father of Shorthorn breeding in the North," was an all-round sportsman, who took a comprehensive view of country matters and grasped the necessity and the possibility of developing agriculture and with it the great cattle industry of the country, which he exhaustively discussed with Hugh Watson of Keillor and William M'Combie of Tillyfour, of Polled Angus fame. With rare judgment he purchased for £150, at the displenishing sale of Mason of Chilton, "Lady Sarah," the originator of one of the most famous of all Shorthorn strains, as well as the progenitor of many of the best Scotch-bred Shorthorns. In 1838 his herd of about eighty cattle, of "great scale and substance," was sold, and realised £3000. This wide distribution among many purchasers of animals of the highest merit at moderate prices gave a wonderful stimulus to the breeding of Shorthorn cattle in the North of Scotland. About two years later he started a second herd, and his old bull, "Mahomed," was put to selected English cows and heifers. At the time of its dispersal in 1847, the herd numbered ninety-one, and sold for £2825. It passed into the hands of Cruickshank of Sittyton, Campbell of Kinellar, Hutcheson of Monyruy, Hay of Shethin, and buyers of similar type, and exercised no little influence on subsequent Shorthorn history.

To **Amos Cruickshank** (1808-95) **of Sittyton** (12 miles North-west of Aberdeen), aided to some extent by his younger brother Anthony (died 1879), remains the credit of giving the best of the Shorthorn cattle of Scotland a world-wide reputation. **The first essential** of an animal with this "canny Scot" was "a good middle," as an indication of digesting power and vigour of constitution. "A broad, full chest, wide back, and deep ribs were his all-and-all," and no other merits could condone defects in these points. He began, like Robertson and Rennie, with a contempt for pedigree, and if the animal suited his purpose, he paid no heed to strains of blood or lines of descent. He was influenced by no prejudices in favour of Duchesses or any other fashionable or speculative strain, but deliberated exclusively on what would conform best to his circumstances and surroundings. On 24th December 1888, **J. W. Cruickshank** supplied the following note to the Author:—

> "What the Aberdeenshire breeders of Shorthorns have always aimed at has been to keep close to the practical object for which cattle are produced. They have always believed that purity of descent and regularity

of form and type are absolutely necessary to success, but they have always recognised that no purity of descent and no mere conformity to certain canons of fashion, however desirable they may be in themselves, can in any degree make good the want of individual merit in the most essential points of beef and milk production. The singleness of purpose with which practical usefulness has been kept in view has led to a slightly different valuation of the most desirable qualities in an animal. One hears little about a waxy horn or a noble carriage—though these attributes are not overlooked—because the qualities which denote vigour of constitution and a tendency to mature early are held to be of higher importance. Aberdeenshire breeders have in nearly all cases been tenant farmers who are dependent on their skill and success for their daily bread—their customers have generally been their own neighbours who are raising cattle for the butcher, and hence the breeders have been pulled up in any course which has been proved to be an error of judgment by the most imperative of all necessities."

Diligent search was maintained by Amos Cruickshank, during numerous periodical personal visits, for animals of the type wanted, and his frequent purchases of both males and females were drawn from many of the available sources in distant parts of England, as well as from his immediate neighbours. For over twenty years he paid no heed to the methods of breeding introduced by Bakewell and followed by the Collings, Bates, and the Booths, but adopted the system of "Natural Breeding," mating by intuition and foresight, the result of extensive experience, animals suitable for his purpose drawn from the Colling, Booth, Bates, and other herds, irrespective of their line of breeding or family connection.

Until 1860 **the policy** was to purchase stock bulls; consequently the uniformity of type derivable from in-breeding was not a characteristic of the herd, which, however, did not lack robustness of constitution nor quality. The good results which followed the use of one of the most famous of the Cruickshank bulls, "Champion of England" (17526), are said to have altered the policy in favour of the use of **home-bred bulls**, but consanguineous breeding was adopted only with moderation and to a degree which secured benefits without such evil consequences as have followed the excessive practice of it among Booth and Bates cattle.

The following are some of the Shorthorn families which are closely associated with the Sittyton herd, and many of them are names to conjure with in the sale catalogues of the present day: viz.—the Avalanches, Broadhooks, Butterflies, Brawith Buds, Barmpton (and other) Roses, Clippers, Cicelys, Duchess of Glosters, Ladies, Lancasters, Lovelys, Lavenders, Nonpareils, Orange Blossoms, Secrets, Spicys, Violets, Venuses, and Victorias.

Bulls were at times **hired** for a season or more, in conformity with the common practice among Shorthorn breeders, and cows and heifers were at one time sent to neighbouring bulls. The first bulls used at Sittyton came from Barclay of Ury.

The following are some of the **most famous bulls** used by Cruickshank in the order adopted by A. H. Sanders,[1] who also recorded the fact that Cruickshank recognised the great importance of studying the qualities of the dam and grand-dam of a bull:—"Fairfax Royal" (6987), a rich dark roan, from W. Torr, said to "rank with the famous bull 'Forth' as one of the best bulls ever owned in Aberdeenshire"; "Hudson" (9228), a yellow red, from W. Linton, Sheriff Hutton, Yorks; "Report" (10704), a roan, from S. Wiley of Brandsby; "Velvet Jacket" (10998), a roan, from J. Douglas of Athelstaneford, East Lothian; "Matador" (11800), a dark roan, from W. Smith, West Rasen, Lincolnshire—a famous bull-getter and own brother to the red roan "Mazurka" cow, which was sold to the United States for $3050; "Plantagenet" (11906), a red and white, from Col. Towneley, through Douglas of Athelstaneford, the sire of the heavy milking twin heifers "Virtue" and "Verdure," dams respectively of "Champion of England" (17526) and "Scarlet Velvet" (16916)—two of the greatest sires of Scotch Shorthorns; "Doctor Buckingham" (14405), a red of pure Booth blood, which cost 400 guineas, exported to Kentucky after establishing the Orange Blossom family; "The Baron" (13833), a red, from Richard Chaloner in Ireland, famous as a prize-winner and as a sire of heifers which grew into fine cows, but went off early and showed indications of disease or delicacy of constitution; "Baronet" (15614) and "Lancaster Royal" (18167), both sons of "Baron," with more constitution than their sire; "Lord Bathurst" (15173), a roan with white legs, which bred remarkably well—being through his daughters "Violet" and "Vintage" grandsire of "Village Rose" and "Village Belle"—the two best cows by "Champion of England," and in the front rank of the best ever bred by Cruickshank; "Master Butterfly 2nd" (14918)—which was a son of flashy show parents, cost 400 guineas, but left stock of little credit to him; "John Bull" (11618), a very long bull, but too high on his legs, which left only two really good cows, "Cressida" and "Jubilee"; "Lord Raglan" (13244), a very valuable bull, bred by Mark MacTaggart Stewart of Southwick (cr. Bart. 1892), described as "large, stylish, but rather high standing, fertile as a yearling, useless as a two-year-old, and, unusually prolific ever after"—sire of three famous cows, "Butterfly 5th," "The Gem," and "Golden Days," this last "the best milker of her time in the herd"; "The Czar" (20947), a red that, through his daughter "Carmine," became grandsire of the noted "Princess

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[1] *Shorthorn Cattle in the United States and Canada*, by A. H. Sanders (1901). (Sanders Publishing Co., Chicago.)

Royal"; "Lancaster Comet" (11663) which came from the superior stock of Wilkinson of Lenton. He was eight years old, and had a large head and "horns of great length," and of almost uniform thickness throughout. Even with these defects he was a good bull. "He stood near the ground, had a beautiful coat of hair, straight top and bottom lines, level quarters, nicely filled thighs, carried plenty of flesh, and was active on his feet." He was in-bred, as his sire and dam had been got by the same bull. He left few calves, but among them was the epoch-making roan bull "Champion of England" (17526), the most successful of all the Sittyton sires.

Sanders says of this last:—

> "One after another of the sons and daughters of this, the greatest stock bull Scotland has ever known, grew up into cattle of the real rent-paying sort. Pages might be filled with the names, pedigrees, and performances of his descendants in the showyards and breeding-pens of Britain and America. Such cows as 'Village Belle,' 'Village Rose,' 'Princess Royal,' 'Morning Star,' 'British Queen,' 'Carmine Rose,' 'Silvery,' 'Mimulus,' 'Surmise,' 'Circassian,' 'Violante,' 'Finella,' and 'Victorine,' would alone suffice to make the reputation of the most ambitious breeder. These and others were retained in the herd. They were robust, thick-fleshed, near to the ground, and possessed a propensity for putting on flesh such as had not been shown by the get of any of his predecessors in service."

Further bulls belonging to Cruickshank, recorded by Sanders, are: "Windsor Augustus" (19157), a roan of Booth blood bred by W. Carr, and used during 1863 and 1864; "Forth" (17866), a light roan, from Sir W. Stirling-Maxwell of Keir, said to be "individually the best bull ever bought for Sittyton," and "the grandest Shorthorn of his time." Although a larger and more finished specimen than "Champion of England," he was not his equal as a sire. But he did good service indirectly to the herd by becoming the sire of "Violet's Forth," an animal that "first drew prominent attention to Cruickshank's breeding in the United States." "Allan" (21172), a red son of "Forth," bred at Keir, which did good work in the herd; "Lord Privy Seal" (16444), a roan sired by a Booth bull and bred at Windsor, which left a few good descendants; "Prince Albert" (27107) which died of foot-and-mouth disease, and was a serious loss to the herd, as the few heifers he left were of superior excellence. **Other bulls** used that were not bred in the herd between 1866-77 were, "Rob Roy" (22740), "Count Robert" (30812), "Scotch Rose" (25099), "Knight of the Whistle" (26558), "Master Darlington" (37067), "Meridian" (38748), "Ravenshope" (22681), and "General Windsor" (28701).

Among the **home-bred bulls** which were kept to intensify the "Champion of England" blood in the Sittyton herd were:—1862, "Caractacus" (19397), a red; 1863, "Grand Monarque"

(21867), a roan, sire of "Scotland's Pride," and grandsire of "Pride of the Isles," two of the best of Sittyton sires; 1864, "Royal Oak" (22792), a roan, and "Prince Imperial" (22595), a red; 1865, "Lord Byron" (24363), a red; 1867, "Cæsar Augustus" (25704), a red, of exceptional merit in the showyard and the herd—some of his daughters, for example "Azalea," dam of "Field Marshal," being most valuable breeding cows; 1868, "Grand Duke of Gloster" (26288), a roan, considered the best of all the sons of "Champion of England," and sire of the excellent red stock bull "Royal Duke of Gloster" (29864) the most closely bred bull in the herd up to his time. The "Royal Duke" coupled with "Princess Royal"—also a Champion of England cow—produced "Roan Gauntlet" (35284), a pear-headed bull of extraordinary quality and breeding potency, the sire of "Field Marshal"[1] (47870), and, through him, grandsire of "Mario"[2] (51713). "Brampton" (37763) was a son of "Royal Duke of Gloster," who became the sire of "Baron Victor" (45944), a bull which earned a great reputation in Kansas; "Cumberland" (46144), born in 1880, a roan, grandson of the "Royal Duke" out of a related Clipper cow, Custard, was also employed in concentrating the Champion blood in the herd. 1868, "Lord Lancaster" (26660), a roan; "Master of Arts" (26867), a roan; and, 1871, "Viceroy" (32764), a roan.

Discussing the success of certain of the progeny, Sanders says (1901):—

> "Those representing the cross of 'Champion of England,' upon cows carrying the blood of 'Lord Raglan,' 'Lord Sackville,' and 'Lord Bathurst,' including 'Grand Monarque,' 'Cæsar Augustus,' and 'Grand Duke of Gloster,' were potent factors in bringing the herd to its best estate."

Sanders gives the following **Summary of Sittyton Sales**:—

> "During a period of thirty-five years, extending from 1842 to 1876 inclusive, there were sold for breeding purposes, from Sittyton, 1030 bulls at an average of £36, 12s. 9d.; and 321 cows and heifers at an average of £32, 14s. 9d.—a total of 1351 animals for £48,247, an average of £35, 14s. From 1877 to 1889, practically the entire surplus of young bulls was sold to the United States and Canada, after the wants of a few regular customers had been supplied. The surplus heifers were mostly exported during these same seasons. A close estimate of total sales made from the herd for breeding purposes for the forty-seven years ending in 1889 includes 1912 animals, for which there was received over £68,000."

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[1] "Field Marshal" was a massive 2500-lb. bull, with a good head, wonderful back, ribs, loins, and quarters, but rather bare below; and he and his stock lacked a little of that soft, mellow covering of flesh so highly prized by so many judges.

[2] "Mario," champion of the English Royal in 1888, was, like his sire, hard to the touch. His dam was "Mina 3rd" by "Border Chief" (37874).

Among many **other Scotch breeders** who drew their inspirations and much of their change of blood from Sittyton, a few names deserve special mention:—Wm. Duthie, Collynie; W. S. Marr, Upper Mill; Sylvester Campbell, Kineller; J. Bruce, Inverquhomery; The Duke of Richmond, The Duke of Montrose, Lord Lovat,[1] Sir Wm. Stirling Maxwell of Keir; Jas. Douglas, Athelstaneford; Syme of Red Kirk; Mitchell of Alloa; John W. and Edward Cruickshank of Lethenty.

The first **two herds** on the list require more than a passing notice, as through them the main stream of Scotch Shorthorn blood has flowed during recent times. **Marr's handiwork** is still conspicuous in the progeny of tribes of cattle which are of high repute among good Shorthorns, viz., the Mauds, the origin of which was an English cow; the Missies, descended from the old Scotch Barclay type, which is in much demand by many of the best breeders in this country as well as in America; the Princess Royals, a vigorous and strongly represented tribe, also much sought after; the Alexandrinas, from which sprang "Gay Monarch" (92411), the great American champion show bull; the Roan, or Red, Ladies; the Bessies, to whom another remarkable show bull, "Sign of Riches" (60324), belongs; the Claras, "one of the soundest of the old local sorts"; the Emmas, that hold a very high place in the estimation of American breeders; and the Goldies, bred from "one of the best Shorthorn cows of her time."

Among the **stud bulls** should be mentioned "Heir of Englishman" (24122), a Seraphina bull from G. R. Barclay, and a renowned show champion which brought the Upper Mill herd into popular notice; and "William of Orange" (50694), a very famous bull of Sittyton origin.

William Duthie inherited the mantle of Amos Cruickshank by securing 36 of the most useful of the Sittyton females at the breaking up of the herd, which numbered 154 in 1889. James Nelson & Sons of Liverpool had bought the herd privately from its owner in his eighty-second year, intending to export it to South America. Duthie secured the animals which were considered too old to ship, and the financial troubles of the time, with which Baring Brothers were associated, resulted in other sections of the herd being kept at home. J. Deane Willis, of Bapton Manor, Wiltshire, for example, bought 33 yearling heifers, or all except 5 Violets, which went to Sutton Nelthorpe of Scawby, Brigg, Lincolnshire. Owing to the success of the progeny of the animals thus retained, Shorthorn breeders of the Old World have reason to be thankful that the intended wholesale shipment was not realised. The Collynie herd had been previously strengthened by the use of the famous Sittyton bull "Field Marshal" already referred to, a bull which, as a calf-getter in Scotland, and for some time in the Royal Herd at Windsor, did much to bring Scotch Shorthorns into favour with English breeders.

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[1] Lord Lovat bred "New Year's Gift" (57796), which was first sold to H.M. Queen Victoria, and bought from the Royal Herd at Windsor by Lord Feversham for 1000 guineas.

Commingling Booth and Bates blood was not generally productive of the immediate results that breeders usually desiderate. It is acknowledged that the Booth bull and Bates cow was the most useful combination.

The introduction of Cruickshank blood into both of the old and fixed types has been productive of much more useful consequences, although it has given rise to a great diversity of opinion as well as diversity of experience. It will be instructive to state what were the early crystallised opinions of leading breeders who favoured us with their views and experiences. The ultimate results of the cross were generally satisfactory with both Booth and Bates lines of blood—the second and third crosses being better than the first. Cruickshank cattle had good appetites, and fattened well. With Booths they produced better bulls and with Bates better females. It is asserted that these Scotch cattle remade the constitution of English Shorthorns, and, while shortening their legs, added to their depth, substance, and wealth of flesh. On Bates cows, with their beautiful heads and stylish carriage, the springing ribs and ample girth of the Cruickshank bulls removed the tribal defect of deficient heart measurement, and the progeny of three Scotch crosses on pure Bates families became in great request for export to the Argentine. The Booth cross brought a very strong quarter from the hook to the tail—a favourite measurement with the butcher. The following are examples of the **criticisms** freely made of crossing with Cruickshank blood:—It improved the middle, but "put the animal wrong at both ends.'' "It shortened the hind-quarters and spoilt the once beautifully chiselled head and curved horns (of Bates cattle), and substituted a mean and 'cocky' horn." Owing to their mixed breeding, "many Scotch bulls were irregular getters and not very impressive sires."[1] "Their hind quarters were short, their bellies big, and their crops defective, and it was necessary to test for tuberculosis." Scotch crosses being all for flesh are of little repute as milkers. It was, and still is said that "the first cross with a West Cumberland cow (famous for deep milking) takes away the front half of the bag, and the second cross destroys the remainder."

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[1] J. Deane-Willis has pointed out that "these mixed-bred Scotch bulls are often called Cruickshank, and the latter often bear the blame for the former's deficiencies."

Average Prices at Auction Sales of Shorthorn Cattle in Scotland, Forty Years, 1882-1921, from the "Banffshire Journal."

Year.	No. Sold.	Average Price per Head.	Year.	No. Sold.	Average Price per Head.
1882	749	£25 19 6	1902	1,060	£30 16 3
1883	554	29 8 4	1903	1,064	33 13 6
1884	895	28 10 2	1904	1,105	51 15 1
1885	865	24 19 5	1905	1,202	43 0 5
1886	986	21 10 8	1906	1,066	63 10 5
1887	753	21 5 9	1907	1,274	47 7 2
1888	883	21 7 7	1908	1,599	30 6 5
1889	713	24 6 6	1909	1,444	35 18 4
1890	1,153	25 7 3	1910	1,301	46 1 11
1891	1,172	24 4 1	1911	1,755	35 11 0
1892	815	22 9 2	1912	1,326	46 0 5
1893	881	20 5 6	1913	1,598	48 14 9
1894	1,227	21 6 0	1914	1,426	51 18 8
1895	1,140	22 9 9	1915	1,403	51 17 6
1896	1,011	27 9 0	1916	1,558	75 15 9
1897	1,145	25 17 0	1917	1,472	99 6 7
1898	1,071	25 18 4	1918	1,651	138 13 0
1899	1,106	32 16 3	1919	1,710	219 10 6
1900	915	31 3 5	1920	2,235	254 2 0
1901	1,079	29 6 10	1921	2,233	102 10 4

In Coates's Shorthorn Herd Book—the British record—"no bull is eligible for insertion unless it has *five crosses*, and no cow unless it has *four crosses* of Shorthorn blood, which are, or are eligible to be, inserted in the Herd Book." In the French Herd Book the first sire in the pedigree must have been born in or before 1830. In the North-American Shorthorn Herd Book it is necessary that the pedigree be recorded in Coates's Herd Book. In the Argentine Shorthorn Herd Book it is essential that the pedigree be traced in unbroken succession of named dams and registered sires to a named dam born in or before 1850; and, where the date of birth of the last named dam cannot be ascertained, it is required that her sire shall have been born in or before 1845. A great many of the best cattle in this country cannot trace so far back in the female line, as among pure Shorthorn breeders it was not the custom in the early days to record all the female connection. The resulting so-called "short pedigrees" restrict the choice of foreign buyers or exporters to the cattle with long pedigrees, and have been the means of elevating the prices of animals with long pedigrees.

The Dairy Shorthorn (Coates's Herd Book) Association was formed in June 1905, when the following promoters, Sir O. Mosley, Bart., Right Hon. Lord Crewe, C. R. W. Adeane, Richardson Carr, Walter Crosland, R. W. Hobbs, F. Punchard,

C. A. Scott-Murray, Rd. Stratton, and G. Taylor, with J. P. Cross and F. N. Webb added, were elected to form a temporary council to draw up the rules of the Association which then took being, with Lord Rothschild as President, F. N. Webb as Hon. Secretary, and a membership of fifty breeders, all members of the Shorthorn Society. The Chairman of the inaugural meeting (C. R. W. Adeane) explained that—

> "It was necessary something should be done to maintain the position of the Shorthorn as a dairy cow. The farmer required an animal which would yield a large amount of milk, and which was capable at the same time of carrying flesh ; the Dairy Shorthorn was the ideal animal for the purpose. The Association would, by offering prizes for milk tests, by securing classes for Dairy Shorthorns, and by recommending judges, do their best to sustain and popularise the Shorthorn for dairy purposes—a breed which had for many years been so justly famous for beef. There was no question of starting a separate Herd Book, and they had the approval of the Shorthorn Council."

Milking Shorthorns have made and are continuing to make rapid progress, and new herds are constantly being formed. The following pioneer registered dairy herds deserve special mention:—

(1) That of James T. Hobbs, at Maisey Hampton, Fairford, Gloucestershire, founded in 1849.
(2) The Underley Hall Herd, owned by Lord Henry Bentinck, near Kirkby Lonsdale (F. Punchard, Agent) founded in 1868.
(3) The Babraham Herd of C. R. W. Adeane, Cambridge (F. N. Webb, Agent), founded 1896.
(4) That of C. A. Scott-Murray, Hambleden, Bucks, founded 1892. (Owned by his son E. J. Scott-Murray.)
(5) That of Lord Rothschild (Richardson Carr, Agent), Tring Park, Herts, started in 1899. This remarkably fine herd was dispersed in 1915, when 179 head averaged nearly 100 guineas.

Official milk records are now kept by the Dairy Shorthorn Association and are published annually in its *Year Book*. For the prizes offered by the Shorthorn Society and the Dairy Shorthorn Association, cows and heifers are required to yield a certain quantity of milk in the ring, and certificates of merit are given to all that pass this test. Bulls exhibited as Dairy Shorthorns must have a pedigree of performance for their dam and their sires' dams ; which must hold an official record of a minimum annual yield of milk.

It may be safely stated of the actual milk yields obtained from Dairy Shorthorns, that many herds average between seven and eight thousand pounds annually for cows and heifers, and exceptional individuals reach twelve or fifteen thousand and occasionally more. A majority of breeders attend closely to beef points as well, and many herds show wonderfully good beef conformation. The pedigree Dairy Shorthorn is thus a general utility or dual-purpose cow.

The following is a short list of some of the **most prominent**, among the hundreds of **breeders** of Shorthorns in Britain. Very many large and valuable herds are necessarily omitted.[1] The type bred is indicated in each case.

His Majesty the King, Royal Farms, Windsor (Scotch); The Prince of Wales (Scotch); C. R. W. Adeane, Babraham Hall, Cambridge (Dairy); William Anderson, Saphock, Old Meldrum, Aberdeenshire (Cruickshank); W. M. Cazalet, Fairlawne, Tonbridge, Kent (Cruickshank); Sir Richard Cooper, Bart., Billington Manor, Leighton Buzzard (Scotch); Richard Cornelius, Lutwyche Hall, Much Wenlock, Salop (Scotch); James Durno, Uppermill, Tarves, Aberdeenshire (Scotch); William Duthie, Collynie, Tarves, N.B. (Scotch); George Harrison, Gainford Hall, Darlington (Cruickshank); R. W. Hobbs & Sons, Kelmscott, Lechlade, Glos. (dual-purpose); Lord Lovat; Lord Middleton, Birdsall, Malton, Yorks (Bates); The Robinsons, Iford, Lewes (dual-purpose); The Earl of Rosebery, Dalmeny House, Edinburgh (Cruickshank); F. L. Wallace, Balcairn, Old Meldrum, Aberdeenshire (Cruickshank); J. Deane Willis, Bapton Manor, Codford, Wilts (Cruickshank); Captain A. S. Wills, Thornby Hall, Northampton (dual-purpose); and the Duke of Westminster, Eaton Hall, Chester (dual-purpose).

Irish Shorthorn Breeders' Association.—The Association's objects are to encourage and improve the breeding and maintain the purity of Shorthorn cattle in Ireland: to collate reliable relative information, and to settle disputes; as well as to promote the interest of owners and breeders of such cattle.

This Association, consisting of 120 leading **breeders** of Shorthorns was formed in 1907, and the following office-bearers elected: President, Lord Rathdonnell; Vice-Presidents, Lord Barrymore, Sir Douglas Brooke, Bart., Sir Hugh H. Smiley, Bart., Rt. Hon. F. Wrench, Charles M. Deyne, D.L., James Byrne, J.P., R. G. Carden, D.L.; Secretary, T. J. Hayes. The first resolution passed authorised a provisional committee to request the Royal Dublin Society to hold sales of pure bred Shorthorn cattle in connection with its spring shows, and as a result highly successful sales were conducted annually by John Thornton & Co. until 1921. The Association has organised autumn sales of pure-bred Shorthorn females and bull calves, and co-operated with the Irish Department of Agriculture and Technical Instruction in connection with outbreaks of foot-and-mouth disease, and in conjunction with the Department it has issued two editions of the *Guide to Irish Shorthorn Herds.* Matters connected with the transport of cattle have been arranged with railway and shipping companies, and questions affecting the cattle-breeding interest, such as the tuberculine test, and importation of Canadian store cattle, etc., are dealt with.

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[1] For complete list see the *Shorthorn Breeders' Guide*, published by the Shorthorn Society, 12 Hanover Square, London.

The Mid-Ulster Shorthorn Breeders' Association, Molesworth Road, Cookstown.—The Association was formed late in the year 1915, the object being to hold periodical sales of pure-bred Shorthorn cattle, and to deal with matters affecting the interests of Shorthorn breeders in the district. Up to this time breeders had no outlet for their surplus females, and although sales had been held at Dublin and Belfast, they were not very successful for various reasons; and as the number of breeders had increased rapidly within a radius of twenty miles from Cookstown it was decided to hold an annual sale there on the same lines as the autumn sales in Scotland. There have been five very successful sales, far exceeding expectations. Members number about one hundred and twenty, and are nearly all tenant farmers.

The **Dexter-Shorthorn Breed**, now (1919) represented by about fifty animals, was originated about 1860 on the Straffan estate in Co. Kildare, Ireland, of Major Bertram H. Barton, when a selected Dexter heifer was put to a pedigree Shorthorn bull. For many years all the male calves were castrated, and a well-bred Shorthorn bull of a short-legged compact type was used. After about thirty-five years Shorthorn bulls were discontinued; but the progeny of the crosses then eligible for, but never entered in *Coates's Herd Book*, which had continued through succeeding generations to be short in the leg, were mated together with satisfactory results. The prepotency of the bulls to reproduce their type when crossed with common country cows has been most marked. The new (D.S.) type has been retained and perpetuated, and the cows are excellent milkers, with a wonderful tendency to put on flesh if a short time idle. This type is a "miniature blocky Shorthorn" with, though not always, certain little Dexter peculiarities, and the robustness and milking properties of the Dexter thrown in. If an occasional calf comes rather long in its legs, it is not bred from. Cows yield 18 to 22 quarts of very rich milk daily. The milking properties and the stature remain Dexter, but the great substance and the faculty for beef production are mainly of Shorthorn origin. The colours are those of the darker Shorthorn strains: the black of the Kerry on the one hand, and the all-white type of Shorthorn on the other, are both absent.

Average Measurements of Straffan Dexter-Shorthorns.

	Bull.	Cow.
Height at shoulder . . .	4 ft. 2 in.	3 ft. 9 in.
Girth behind shoulder . . .	7 ft. 2 in.	6 ft. 4 in.
Length from shoulder to point of tail	4 ft. 4 in.	3 ft. 10 in.
Height from ground . . .	12 in. to 14 in.	12 in. to 15 in.

All credit for developing the breed is due to the highly valued steward, the late Thomas Milne, who managed the herd till 1918.

The Maoile is a very hardy, old Irish, polled breed of fairly large size, and often of a pepper-and-salt colour tending to black roan. The name is not derived from the place-name "Moy," but it means polled or bald, equivalent to the U.S.A. "Muley" and to Old English "moiled," indicating the lack of horn defences.

In the early years of this century Major John Murray, Ballygoran Park, Maynooth, Co. Kildare, began, with the object of founding a herd, to collect some of the few remaining typical female specimens from the counties of Tyrone, Armagh, and Sligo, where until recently they were found in considerable numbers. "Stella," the first, and one of the best original foundation cows, was brick-red in colour with a mixture of white hairs through it, a white underline and udder, and star on the forehead, and showed a well-elevated pelvic arch, "Governor Hoard's bump," as a guarantee of milking merits.

Although no hornless males have been seen for a good many years, it is claimed that the superior breed-characteristics, here correlated with the polled condition, have been handed down through the female line for many generations, as in the case of the Dexter-Shorthorn on the foregoing page, and of the hunters of the North of Ireland referred to on page 508. The animals have been described as "lengthy, low, broad in the hips, and wonderful milkers, besides being easily fed, healthy, and docile." Although both Aberdeen-Angus and Red Polled bulls are now numerous in the native districts of the breed, the polled condition is claimed to be distinctly ancient Irish. The hornless bulls now employed are exclusively derived from an out-cross with the Shorthorn, and if this proves to have been of the milking Shorthorn type a useful commercial breed has a good chance of being regenerated. "Safeguard" (Plate LXXIV. B), the first hornless bull, bred May 1910, was by "Cloughguard" (S.H.) out of "Nancy."

Subjoined is the wonderful breeding record of "Starlight," calved 25th March 1905 (Plate LXXIV. A):—19 living calves in ten years and nine months, including three times dumb-martin twins:—

1908. June 17, bull.
1909. Oct. 26, twin bulls.
1910. Nov. 15, twins (bull and martin).
1911. „ 17, twin heifers.
1912. Dec. 5, twin bulls.
1913. „ 13, twins (bull and martin).
1914. Dec. 25, twins (bull and martin).
1915. „ 27, bull (huge).
1917. Jan. 26, twin heifers.
1918. Feb. 1, twin bulls.
1919. Mar. 25, bull.

The other traders of Maoile cattle are Captain Herbert Dixon, M.P., New Abbey, Kilcullen, Co. Kildare; and J. T. Maher, Williamstown, Clonsilla, Co. Dublin; who had 7 cows and heifers in 1919.

Lincolnshire Red Shorthorns.—Low's statement in *Domesticated Animals of the British Isles* (1845), under the heading "Shorthorned Breed," appears to throw light on the origin of the Lincoln Reds and their well-known aptitude as dairy cattle:—

> "In the fens and marshes of Lincolnshire, and the other tracts of alluvial country towards the Wash, the cattle were of great bulk and coarse figure, and had usually a dingy colour of skin, and short blunt horns. More inland, and following the course northward of the Vale of Trent, and thence across the Ouse, through the central plains of Yorkshire, to the river Tees and beyond it, the cattle assumed a less gross and unwieldy form, but were still a very tall race, of varied colours, with horns of medium length, but which might be termed short with relation to the same parts in the Longhorned breed.
>
> "In comparing these varieties of cattle with the races of the opposite continent, the large dingy breed of the fens may be compared with the native black cattle of the flats and marshes of Holland; and the more varied kinds north of the Humber with those of Holstein and Jutland, whence the finest cattle of the North of Europe have been derived. . . . But at a long subsequent period, near our own times, it appears that cattle were frequently brought from the opposite continent, and mingled with the native varieties. They were chiefly imported from Holland, the cows of which country were the most celebrated of all in the North of Europe, for the abundance of milk and their uses for the dairy."

It has been already shown that the refining of the Shorthorn breed and concentrating the characteristic known as "quality," began in Durham and North Yorkshire, and that from this fountain flowed in many directions the best Shorthorn blood. Three bulls were secured at the Collings' sale in 1810 for Lincolnshire; and, following the common practice of the time, many other bulls were no doubt hired from leading Shorthorn breeders to run for a season among the old Lincolnshire herds.

Thomas Turnell, Beasley, Wragby, before the beginning of the nineteenth century owned, on the authority of Arthur Young, a very excellent herd of cattle of medium size, which "originally came from the neighbourhood of Darlington"—the centre of the home of the improved Shorthorn. Turnell may be credited with leading the fashion for a deep cherry-red colour of hair, now so much appreciated among export cattle. Other early successful breeders were—Baumber of Somersby, Cartwright of Tathwell, Oliver of Eresby, and Lord Willoughby de Eresby

—the last introducing them to the extreme south of the county. The **Chattertons** also for two generations maintained the character of the breed, "especially by two most successful out-crosses they made by sending a famous cow bred by Coulam of Withern, to Lord Exeter's "Cambridge Duke V." (C.H.B. 30644), and in later times in sending one of their best cows to Deane Willis's "Windsor Benedict" (C.H.B. 40933), the result in each case being most impressive." The bulls from those two unions did great service to the breed. "The Burts of Welbourne also maintained one of the oldest herds," which by the name of "Welbourne Reds" exercised influence in the South and West.

"The Lincolnshire type of Shorthorns (says the preface to the *Lincolnshire Red Shorthorn Association Herd Register*)[1] is now distinguished by its length of frame, good constitution, great hardiness, capacity for milk, and great weight of carcase; 8 to 10 cwts., now, more correctly stated, 13 cwts., being usual weights for grass-fed three-year-old bullocks, and up to 24 cwts. for stall-fed cattle.

"All over the county they are to be found in that flat stretch which runs from the south through Lincoln and the Gainsborough district to the Humber; and in the Wolds, where they are required in winter to get the straw trodden in the 'crewyards' from Brocklesby through Binbrook by Horncastle to Boston. But the finest cattle are grown on the rich flat between the chalk hills and the sea, and the largest cow seen was at North Cockerington near Louth, in the hands of a small farmer, who said she had made 20 lb. of butter several times in one week soon after calving."—G. A. P., 1911.

About the middle of April they are turned out to work for their own living and face the bitter east winds from the North Sea. They have acquired the faculty of laying on a wealth of lean flesh as well as "providing a bountiful supply of rich milk." The flesh has improved in quality, but "still is hardly as fine in the grain as that of the best Shorthorn." The use of Shorthorn bulls on light-fleshed Shorthorn cows, to get an improved cross-bred animal for either meat or milk production has proved a marked success. "The colour is very impressive, and the calves come deep reds and dark roans. Their clear noses and bright prominent eyes make them look very breedy." "A well-bred bull will usually throw darker red calves from cross-bred cows than from pure Lincolns." In comparison with the get of a Shorthorn bull—the get of a Lincoln bull represented by wintered-out heifers "all from the same class of Shorthorn cows"—the half-bred Lincolns were full of flesh "and worth some pounds per head more than the others."

There is an **annual sale of bulls** at the **Lincoln** April Fair, held under the auspices of the Association. Although in the early days of Shorthorn **registration** the Lincolnshire breeders prided themselves on refusing to enter their cattle in *Coates's*

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[1] See also *A Short History of the Lincolnshire Red Shorthorns*, by Geo. E. Collins. Lincoln: J. M. Ruddock & Sons.

Herd Book, still records of the leading herds have been privately kept for over a hundred years, before the register of the Lincoln Red Shorthorn Association was started in 1895. The necessity for a *Lincolnshire Herd Register* arose from the fact that a large proportion of the best animals of unmixed blood were not eligible for *Coates's Shorthorn Herd Book*—although a limited number of Lincoln Red cattle are eligible for both records. The strain is rapidly developing into one of the best lines of **milking cattle** in England, in spite of the milk-degenerating effect of the long established custom of allowing the cows to rear their own calves. Registered herds are springing up all over England outside the county boundaries.

The Burton milk records relating to the registered Lincoln Red Shorthorn Herd of John Evens, Burton, near Lincoln, which go back for over thirty years to 1890, are the earliest we have been able to find of this breed. They fully establish its high merit on the milking side as a dual-purpose breed.

Burton Milk Records from 1890.

31	cows	calving in	1890	averaged	740	gallons per cow.
35	,,	,,	1891	,,	702	,,
34	,,	,,	1892	,,	795	,,
38	,,	,,	1893	,,	732	,,
39	,,	,,	1894	,,	834	,,
43	,,	,,	1895	,,	867	,,
43	,,	,,	1896	,,	889	,,
36	,,	,,	1897	,,	881	,,
38	,,	,,	1898	,,	824	,,
34	,,	,,	1899	,,	860	,,
36	,,	,,	1900	,,	785	,,
48	,,	,,	1901	,,	758	,,
40	,,	,,	1902	,,	776	,,
42	,,	,,	1903	,,	780	,,
43	,,	,,	1904	,,	842	,,
54	,,	,,	1905	,,	816	,,
48	,,	,,	1906	,,	802	,,
53	,,	,,	1907	,,	771	,,
50	,,	,,	1908	,,	810	,,
51	,,	,,	1909	,,	838	,,
51	,,	,,	1910	,,	854	,,
49	,,	,,	1911	,,	824	,,
45	,,	,,	1912	,,	788	,,
53	,,	,,	1913	,,	856	,,
48	,,	,,	1914	,,	794	,,
57	,,	,,	1915	,,	893	,,
21	,,	,,	1916	,,	816	,,
13	,,	,,	1917	,,	758	,,
21	,,	,,	1918	,,	758*	,,
45	,,	,,	1919	,,	765	,,
30	,,	,,	1920	,,	796	,,

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* 48 per cent. were first-calf heifers.

The non-pedigree Shorthorn is bred to greatest perfection on a large scale in the more sheltered dales and the lowland country of the North and West of England—chiefly Cumberland, Westmorland, Lancashire, and Yorkshire. Milch cows of the older type of Teeswater cattle are there reared and sold when at their prime, after the fourth or fifth calf, to supply the needs of town dairies such as those of Edinburgh and Leith, Glasgow, and other large centres of population in Scotland, the North of England, and London. The Yorkshire cows are smaller than the West Country cows, but they show good Shorthorn quality, and are deep milkers. For animals of large size and strong bone the districts about Kendal and Preston are noted.

In the higher valleys, the recent home of the hardy Longhorn (see page 99), where the climate is too severe for the pure Shorthorn to give satisfactory results, crossing with Scotch West Highland cows has been very successful, but the progeny are more appreciated at home than in the town dairies, although a few are found there under the name of "half Scots." They are large framed and rough coated, and are good milkers, although the udders may be badly shaped. The dark-greys, which are often produced by a light-coloured Shorthorn bull on a black West Highland cow, are in favour on their merits as hardy general-purpose cattle. The progeny of the cross cows are not very reliable breeders about the second or third generation.

As the bulls are selected from what have been recognised as pure Shorthorns for generations, and from heavy milking cows, the great majority of the cattle are pure though not with pedigree record. Any connection with *Coates's Herd Book* is a very poor recommendation to the ordinary practical dairy farmer in the non-pedigree Shorthorn country, and reduces the value in the dairy-cattle market of animals of both sexes. Many of the cattle are light in colour, and a favourite colour for a bull is a light mealy roan (Plate XVI.). Up till August 1914, cows of the best class sold to go out of the district at or round £20; conspicuous specimens, to be trained for showing, fetched £30 and £35. During the war, prices rose to anything between £40 and £140. There is an unlimited demand for heifer calves at good prices—a white calf, not being in favour, may fetch less than others. Heifers calve at three years old on the uplands, but at two in the vales, and are at that age most likely to develop into good milkers. The milking qualities of this section of the Shorthorn breed are dealt with at page 330.

The following brief note by an authority, brings the subject of **milk recording in England** to date 2nd April 1920. Milk recording in England and Wales was more or less neglected until the Board of Agriculture attempted to stimulate interest by a system of grants in aid of societies. Since 1914 when the first grants were made, milk recording has made great strides, though the Great War naturally hindered the work. It is safe to say that the British farmer now realises that a good milk record adds value to an animal whether it be pedigreed or non-pedigreed. The Ministry of Agriculture now issue official certificates of milk yields. They also publish an annual register of heavy milking animals of any breed, and the size of the register grows enormously each year. The Dairy Shorthorn Society now register approved non-pedigree cows as Foundation cows, while the Cumberland and Westmorland Dual-Purpose Shorthorn Association propose to issue a Herd Book based on milk records and conformation. A recent dispersal sale of non-pedigree Shorthorns showed the remarkable average of £118, 18s. 10d., while at a collective sale at Penrith in 1919 a class of 12 cows, 11 of which were non-pedigree, realised an average of £107, 7s. 7d. The future prospects of milk recording are exceedingly bright, and farmers are joining milk recording societies in almost embarrassing numbers.

The Polled Shorthorn is an offshoot of the Shorthorn breed which originated in the State of Ohio about 1870, and which has been cultivated on account of the advantages derived from the absence of horns on the open range, and in a country where both store and fat animals frequently travel far to market. (See "Alloy" strain, p. 64, and footnote, p. 92.)

The breed has two distinct sections—(*a*) **double** standard, and (*b*) **single** standard. The first are pure bred Shorthorns descended from Charles Colling's "Alloy" strain, and eligible for registration in the *American Shorthorn Herd Book* and in the *American Polled Shorthorn Herd Book*.[1] The second were bred from native "Muley" cows, crossed through succeeding generations with pure Shorthorn bulls until they are now pure by crossing.

Muley cattle are, according to H. F. Euren, the descendants of the hornless cattle taken from East Anglia to Virginia by colonists who, on settling, called the district Norfolk. At that time there was on the western borders of Suffolk a polled breed of heavy milkers of the Shorthorn type.

Professor H. W. Mumford, of Illinois University, confirms the Shorthorn relationship on the score of appearance, and adds to the authoritative record of the breed as follows:—

> "All along the Potomac, in Virginia, 'muleys' are numerous, and they are found occasionally in other sections of the country. A majority of

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[1] The average double standard bull bred to horned cows produces from 60 to 85 per cent. of hornless calves, though an occasional bull may sire 100 per cent. polled calves from horned cows.

them give abundant evidence of carrying high percentages of Shorthorn blood.

"'Native muley' cows were selected which conformed as closely as possible to the Shorthorn type. These were mated with registered Shorthorn bulls, and the female offspring, if polled, reserved for the breeding herd. This line of breeding was continued for from three to six generations, when the polled cattle thus produced were mated, in order to fix the polled characteristic. Founders of the breed report that it was necessary to discard large numbers of the cattle produced in this way, as many did not compare favourably with the Shorthorn's individual merit. Many, too, were not polled. The plan, then, was grading up with the Shorthorn and not cross-breeding. The majority of Shorthorn breeders looked with much disfavour upon this venture of certain men to produce a hornless type of Shorthorn. A notable exception to this was that now venerable breeder of Shorthorns, William Warfield, of Kentucky.

"In the early history of the breed, many outsiders suggested the use of cross-bred Shorthorn Red Polled bulls to hasten the fixing of the polled characteristics. These animals were, however, not used, nor were they admitted to the first volume of the record.

"Among the pioneer breeders of Single Standards were W. W. Crane, Tippecanoe City, Ohio; W. S. Miller, Elmore, Ohio; A. E. and J. F. Burleigh, Mazon, Ill.; Peter and John R. Shafer, Middletown, Ohio; S. R. and Clinton Clawson, Clawson, Ohio; Leander Caywood, Frederickstown, Ohio; and Z. T. Dunham, Dunlap, Iowa. Of all of these only Caywood and Dunham were living in 1918. The latter is still breeding Polled Durhams and is the principal breeder of Single Standards."

Crane and the Shafers established good Single Standard herds and J. H. Miller, Peru, Indiana, bought both of them, and placed himself in the position of the leading Polled Shorthorn breeder. With this purchase he secured the bull "Young Hamilton," and mated him to Scotch cows from the herd of Colonel W. A. Harris, by which he produced Double Standard Polled Shorthorns.

Animals to be eligible to entry in the *American Polled Shorthorn Herd Book* must be at least three months old; must be naturally hornless; must have both parents recorded therein, or have one parent recorded in the **x** book and the other parent recorded in the *American Shorthorn Herd Book* or other accredited Shorthorn Record; and further, must have all their eligible ancestry recorded in the *American Polled Shorthorn Herd Book* [1]

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[1] The *Farmers' Tribune* (U.S.A.) explains that the **pure-bred branch** of Polled Shorthorns has come of three families, viz., White Rose, Young Phyllis, and Gwynnes. The honour of founding a family of hornless Shorthorns rests with "Oakwood Gwynne 4th" (vol. xv., page 803). She was a roan cow of the Gwynne family, bred by W. S. King of Minneapolis, Minn. She had very light horns or scurs, yet she produced three calves (1881-3) that were entirely hornless, when bred to the "7th Duke of Hillhurst" (34221), viz.:—(1) a superior animal and (2) a pure "Duchess" closely related to the cow that sold for $40,600 at the New York Mills Sale. Two of these heifers—"Mollie" and "Nellie Gwynne" (vol. xxxiii., page 728)—both entirely hornless. She was then (3) bred to "Bright Eyes Duke" (31894),

The American Polled Shorthorn (Durham till 1919) Breeders' Association was formed in Chicago in 1889, but not incorporated till November 1890, with William W. Crane, of Ohio, as President, and not recognised as a stock company till 1902. It was not till 1903, at the Columbian World's Fair, that any leading exhibition admitted the breed to a full list of premiums.

Polled Shorthorns are claimed to be superior dual-purpose animals, good milkers and rapid fatteners, and the claim was well substantiated by "Young Hamilton" (114169), from Peru, Indiana, carrying off the sweepstakes prize in the General-Purpose Class against all comers. He was a bull of wonderful vitality and constitutional vigour. In his prime he attained the weight of 2800 lb. and did active service up to the time of his death at the age of seventeen years.

"The first *Herd Book* was published (as a re-issue) in 1898, containing all pedigrees recorded from the date of organisation to 1st September 1897, in number, 1321. There will be recorded this year (1918) considerably more than twice as many pedigrees as were recorded by the organisation in 1889 to September 1897. Each succeeding *Herd Book* contains an increase of pedigrees as here shown: vol. i., published in 1898—1321; vol. ii.—3652; vol. iii.—4585; vol. iv.—5230; vol. v.—6211; vol. vi.—8413; vols. vii. and viii.—10,185. This year shows a decided increase. There have been recorded since reorganisation to date, 18th July 1918, 40,628 pedigrees."

and the result was a polled red bull calf, recorded as "King of Kine" (87412). **W. S. Miller of Elmore**, Ohio, bought "Mollie" and "Nellie Gwynne" and "King of Kine" (all descended from "Medora") in the spring of 1888. Captain Miller added to his herd from the Kirklevington Rose of Sharon, Young Mary, and Phyllis families, and used "King of Kine" at the head of his herd, for three years, and 90 per cent. of his calves from horned cows were hornless. Then for two years he used "Ottawa Duke" (109292 or 185, P.D.H.B.), sired by "King of Kine," dam "Nellie Gwynne." He was bred to horned cows, but every one of his calves was hornless.

CHAPTER V

CATTLE—LONGHORNS AND HEREFORDS

The Longhorn Breed—Low on its Habitat—Gilpin's Observations—Bakewell—Other Early Breeders—Fowler and Chapman—Points of the Original, and of the Improved Breed—Competition with the Shorthorn—Horn Dimensions, Shape and Origin—Colour—Crosses—As Dairy Cattle—The Longhorn Cattle Society and *Herd Book*—**The Hereford Breed**—Early History—Traditional Importation of Cattle from Flanders—Improvements of the Breed in Eighteenth Century—The Tomkins Family—Benjamin Tomkins (Senior's) "Silver Bull"—Marshall's Account of the Breed—Gallier's (of Wigmore Grange) Sale—Agricultural Society of Hereford, 1797—John Price of Ryall—The Hewers—Colour Controversy—Prominent Early Breeders—*Herd Book* begun, 1846—Famous Bulls—Draught Oxen—Smithfield Club Prizes—Freedom from Tuberculosis—High Prices—Exports in 1919—Herefords as Milkers—Wm. J. S. White's Herd—Points of the Breed by Bitton—Herefords in United States, Canada, Uruguay, Brazil, Argentine, New Zealand, South Africa—Polled Herefords.

AS now seen in this country, the Longhorn is a remnant of a breed which during the eighteenth century and the first decade of the nineteenth century held a position of high importance as a milking breed and as a producer of large carcases of coarse beef. During that period, when the work of field cultivation was mostly done by oxen, it was said to be the most widely distributed and the most valuable British breed of cattle.

Longhorns.—The following extract from George Garrard's book (1800) entitled: *A Description of the Different Varieties of Oxen common in the British Isles*, is of interest:—

"The breed of Longhorned cattle has been established from time immemorial in the North of England, where we find them spread over a large tract of country comprehending part of Yorkshire, particularly the Craven district, part of Westmorland, Lancashire, Cheshire, and over the shires of Derby, Stafford, Shropshire, Warwick, Leicester, Worcester, and Northampton, and they have been occasionally dispersed through the adjoining counties. Between 1760 and 1800 they were so exclusively the stock of the south of Staffordshire that an individual of any other breed would have been gazed at as a new animal."

"As to the general merit of the stock for the dairy, from 16 to 24 quarts, at two meals per day, is the usual produce, but some individuals will give much more. In Staffordshire, cheese is the principal object, and

5 cwt. of 120 lb. is often made from one cow in the year, but 3 cwt. is a more common produce."

"About 1710 a Mr Webster brought some Longhorned cows from the banks of the Trent to Canley, near Coventry in Warwickshire; they were derived from Sir Thomas Glasby's breed, which are said to have been originally brought from Westmoreland and Lancashire. With respect to colour, six of his best colours were red, and the other colours most approved of were the brindled finch back, and the pied" [*sic*].

"About the year 1750, Robert Bakewell of Dishley Farm, near Loughborough in Leicestershire, being then about twenty-two years of age, began to pay particular attention to the improvement of the different kinds of live stock. The Dishley Cow Stock, which has acquired much distinguished celebrity, originated from some of the Canley heifers (Webster mentioned above) crossed with a Westmoreland bull, procured by Bakewell. From this cross was produced his famous bull 'Twopenny.'"

"In a few years his cattle became in great request, and from the difficulty, time, and expense which it had cost him to acquire his prime stock, he was rather cautious in parting with it, and therefore he established a new system in the mode of improving stock, which was to let out for one season only his bulls, and this answered so well that by the year 1770 he had many bulls let out from 5 to 30 guineas each for the season. His famous bull 'Twopenny' had covered at 5 guineas each cow. His breed was anxiously sought after by the most respectable breeders of his own and neighbouring counties. Bakewell died in 1795. To his exertions we may trace the establishment of the Board of Agriculture."

"Fowler of Rollright in Oxfordshire was not long after Bakewell in his attention to cow stock. He also began his improvements with two cows from Webster's stock, to which he hired Bakewell's bull 'Twopenny.'"

"Fowler's cattle were sold in 1791, and 53 head made £4289, 4s. 6d., bulls made up to £250 and cows up to £273."

"In 1784, Princeps hired the bull 'Shakespeare' for two seasons at 80 guineas a season; and this bull was sold in 1795 (13 years old) at 400 guineas, the seller reserving the right to send two cows to him yearly. He afterwards covered at 25 guineas."

Professor Low (*Domesticated Animals*) says: "The true Longhorns seem to have been the inhabitants of the western parts of the British Isles. They extended over nearly all the plains of Ireland and the greater part of the mountains, and yet (1845) form the prevailing race of that country. In England they occupied Lancashire, extended northward into Cumberland and Westmorland (where many herds existed in the hilly country), and southward through Cheshire and Shropshire, to the districts on the Severn, and even into Somersetshire, where traces of them still exist in the higher country. From the mouth of the Severn they extended inland through the Midland Counties (the stronghold of the breed) even to Leicestershire (and one herd to Hampshire in 1780). They were also found in Derbyshire, but not, within the period of any records, in the South-Eastern Counties of the chalk. . . . Thus the breed appears to have been derived from the Western and more humid counties, and to have disappeared or lost its distinctive characters in the Eastern and drier."

History does not state definitely whether the Longhorn came from Ireland, where it has been "for a period of unknown antiquity," or was taken there from the West of England. The fertile pastures of Ireland produced "a great development of form and size in the animals." The herd on the Earl of Westmeath's estate at Pallas, County Galway, is said to have been bred pure for over 200 years—fresh blood being imported from England from time to time.

The rich district of Craven in Yorkshire has been specially referred to as the centre from which superior bulls were distributed to other parts of the country, although Lancashire got the credit of being "the nursery of the breed" in England.

William Gilpin, in his *Observations, made in* 1776, *on several parts of Great Britain and the Highlands of Scotland*, says, page 180:—

"In Lancashire we frequently observed a breed of large cattle, which in the county is called the 'Wag-horn' breed, from the manner in which the horn bends under the eye. In other counties I have heard them called 'lough-horned'[1]; but throughout England they are commonly known by the name of the 'Lancashire' breed of cattle (also 'Leicestershire,' 'Warwickshire,' or the 'Dishley' breed). They are said to be fleshy, and more proper for the shambles than the dairy; though in Lancashire, we were told, they are esteemed the best milch-cows. Their twisted horns give them a peculiar and picturesque cast of countenance."

The horn shown in Plate XXXI. A, copied from Gilpin, is identical in shape with the ancient hunting horn[2]; but it differs materially from the modern horn of the breed. After hunting horns fell into disuse there would be no need to breed to a special shape of horn, and irregularity in the direction of the horn would follow as a natural consequence. The change of fashion in favour of the Shorthorn and, in some districts, the Hereford—the two breeds most responsible for supplanting the Longhorn—was no doubt largely due to the more rapidly maturing qualities of these breeds.

Robert Bakewell of Dishley, Leicestershire, accredited as the great originator of the system of improvement of live stock by in-and-in breeding, selected about 1750 or 1751 the

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[1] Probably a misprint for "bough," *i.e.*, "bent"-horned, or got from *Lough*borough when (see page 105) Sir William Gordon bred improved Longhorns before Bakewell. "Bough-horned," Halliwell gives Bought = a bend, a joint, a curve.

[2] A similar horn for calling in cattle from the sands was found at the farm of Drumburgh, on the Solway, and is now in Tullie House museum (Carlisle).

Longhorn, among cattle upon which to carry out his operations. He started his female stock with two heifers reared at Canley—a red and a yellow respectively. His object was to increase the rate at which they came to maturity, to improve the quality of flesh, and to reduce the size and coarseness of bone. In this, so far as his own cattle were concerned, he so far succeeded well, but at the sacrifice to some extent of constitution and the powers of milk production. He died at the age of seventy, in 1795, without transmitting the secrets of his system, or recording the lessons he had learned from his extensive breeding experiments; and on this account it has been asserted that the work which he began was not carried to a successful issue.

But before Bakewell's time there were **early improvers** of the Longhorn as there were before the Collings in the case of the Shorthorn; for example (in 1720), Sir Thomas Gresley of Drakelow House, near Burton-on-Trent, in Staffordshire, who "took such delight in keeping a dairy of cows similar in colour and shape"; Welby, a blacksmith in Linton, who imitated Sir Thomas; Webster of Canley, near Coventry, in Warwickshire, who bred the first historically famous sire, "Bloxidge"; and Sir William Gordon of Garrington, near Loughborough. It is on record that it was from a cow bought from Gordon that Bakewell bred "Twopenny," the first of his famous stud bulls, about five years after the purchase of Webster's two heifers. "Twopenny" was hired to Fowler of Little Rollright, Chipping Norton, to mate with choice cows also from Webster's herd.

Of many breeders that followed Bakewell's example, **Robert Fowler** of Little Rollright, in Oxfordshire, was the most prominent. From animals of Bakewell's blood he produced "Shakespeare," a bull which occupied a position among Longhorns similar to "Favourite" and "Comet" among Shorthorns. He was by the famous Bull "D" out of a daughter of "Twopenny." At Fowler's sale in 1791, 51 animals, including calves and some old cows past breeding, averaged £85, 2s. 3d. The highest priced two-year-old bull, "Sultan," realised 210 guineas, and the highest priced cow, "Brindled Beauty," 260 guineas. The Rollright catalogue revealed in-and-in breeding to a dangerous extent. Bakewell's herd was valued to his nephew at from 20 to 70 guineas each.

Bakewell said that **George Chapman** of Upton had the best of about seven famous herds of Longhorns bred on Bakewell's plan. Of the owners of these the following lived within an hour's ride on horseback, viz., Ashley, Bakewell, Paget Knowles, Chapman, Stone, Wilkes, Taverner, and Green. Among the ten founders of the Smithfield Club in 1798, Ashley and Wilkes were numbered, and Wilkes proposed the formation of the Club.

"**The Longhorn**," said **Low**, ". . . before the artificial improvements, . . . varied in size with the fertility of the districts to which it became indigenous [*sic*], being larger in the richer plains and smaller in the mountains. The prevailing colour . . . was black and brown, and they had more or less of white on the body, a (white) streak always extending along the spine. They had thick, dark skins, and abundant hair. Their horns were long, and bent downwards; a peculiarity, however, which seemed to give place to the influence of external agents, since, at the eastern and southern limits of the breed in England, their horns frequently turned upwards, in the manner of other cattle inhabiting these districts (differing from the Lancashire type, Plate XXXI. A). Their bodies were long [a present-day characteristic], their sides flat, and their shoulders heavy as compared with their hind-quarters. They were hardy, capable of subsisting without shelter and on indifferent food, but they were **slow in arriving at maturity**. Their flesh was of a dark colour, and the fat of a yellow tinge. They were of docile temper, and steady in the yoke, though sluggish in their motions. They were with difficulty amalgamated with other varieties, retaining, with greater obstinacy than any other race, their distinctive characters. The females were suited to the domestic dairy, yielding good milk, though not in large quantities."

Low also indicated the more conspicuous of the **improvements** that were **effected by Bakewell** and his disciples.

"**The Dishley breed** (Bakewell's) is of good size, but generally inferior in weight to the old Lancashire Longhorns, the Shorthorns, and Herefords. . . . The shoulder is well formed, the neck remarkably thin, head fine, and the limbs are moderately short and small boned, in which respect the artificial differs from the natural breed. The skin, though thick, is soft, and the hair is usually reddish-brown, with more or less of white on different parts. The ribs are remarkably well arched, forming a fine cylindrical trunk; the loin is moderately broad, and the hind-quarters are long. The animals are docile, easily maintained on ordinary food, and readily fattened. The flesh has never entirely lost that darkness of colour distinctive of the unimproved race, and the fat is less mixed with the muscular parts than in any other kind of British cattle. The tendency of the fat to accumulate on the rump is so great as to produce a kind of deformity in the fattened animal. . . . The fat, too, retains the tinge distinctive of the older race. . . . The cows are eminently deficient in the power of yielding milk. They are in this respect greatly inferior to the older Longhorns, and are scarcely ever used for the purposes of the regular dairy."

It is not to be wondered at that the improved Shorthorn of the early days—a first-rate general-purpose animal—should supersede this incomplete product of Bakewell's art of breeding. **Bakewell's method** weakened the constitution, and led to the loss of lean flesh or muscle as well as to the decline of the breeding and milking properties of cattle. Being overdone, in his haste to secure refinement and uniformity, it led directly to the disfavour of the breed early last century.

The Longhorn was seriously **worsted in competition** for public favour by its Shorthorn rival; but, after it had been driven from the richer parts of the country, except for a limited number of good standard herds, by the more rapid maturity, finer quality, animal, it lingered in the Fell districts of the North-West of England into the latter half of the nineteenth century. In the fifties, a wave of popular enthusiasm for the Shorthorn led to the practical extinction, within about ten years, of the Longhorn as a breed in that district of country. The change was effected in part by breeding the cows to Shorthorn bulls, and, as the progeny practically became "pure by crossing," it was realised when too late that in many respects the Longhorn was better suited than the Shorthorn to the local conditions. The Author paid a visit to the district in 1905, and heard from men who had seen the change accomplished, their acknowledgment of the mistake. The local variety of the breed was said to consist of splendid cattle for the Fell districts. Many had the white stripe on the back and flesh-coloured noses, but the prevailing colour was dark roan with black ticks through it (brindled). The milk was rich, though not so abundant as that of the Shorthorn. The beasts were extremely hardy, and kept themselves fat in winter, living outside till snow fell. The hair was curly, like that of a spaniel, and the horns were so long that in entering a doorway the head had to be turned to one side and one horn introduced before the other. [Marshall states that the **horns** of the improved breed measured from 15 in. to 2 ft. for bulls, and from 2½ to 3½ ft. for oxen; while the cows' horns were nearly as long as those of the oxen, but finer and more tapering.] The animals did not grow so quickly as the present cattle, but they were less dainty, required less food and less attention, and were heavier and better beasts in the end. An ordinary bull ran up to 20 stones of beef per quarter, but the beef was not so fine, being both dark and coarse. After the Longhorn blood was nearly bred out of the Fell cattle by the repeated use of Shorthorn bulls, it was found necessary to restore the hardiness of the progeny by the use now and then of West Highland bulls.

Curiously enough, a **connection** between the **West Highland** and Longhorn breeds is indicated by the progeny of Highland cows by a light roan Shorthorn bull, frequently assuming one of the recognised colours of the Longhorn, viz., a mealy-red roan with a broad white stripe along the back. Sir James Sivewright annually breeds a number of these and of Galloway crosses at Tulliallan Castle in Fifeshire. The hair of their winter coats is more ruddy and much harder than those of Galloway-Shorthorn crosses, which are easily distinguished from them.

The historical preface to vol. i. of the *Herd Book* says:—

> "In 1864, the last remaining herd of Longhorns in Cumberland was sold, belonging to Isaac Fletcher of Riggs, Wythop, and the general opinion of the breed in that district was, that for hardihood of constitution, richness of milk, and small consumption of food, they were unrivalled; thriving well in the hardest winter without any roots; seldom requiring shelter, from their thick hides and strong coats; but they were considered slow growers in arriving at maturity."

In no important particular, except probably in mildness of disposition, do present-day Longhorns resemble Shorthorns. Their colouring is very different.

> "The white line along the back, with a white patch or mark on the thigh, is looked upon as strictly orthodox; occasionally purely bred animals are found entirely self-coloured, whilst in others the sides of the body may be either red, brindled, grizzly roan, or any of these colours intermixed with small white specks or flakes."

The colour most admired is the dark red brindle (the bluish tint having gone out of favour) with the white line along the back.

The long, irregularly shaped, sweeping **horns** form another striking difference. It would seem that the Longhorn inherited its horn development from the *Bos primigenius*, through its more immediate ancestors the wild forest cattle, as represented in the Chartley Park breed, but with horns abnormally lengthened. The position becomes more interesting in view of Low's emphatic pronouncement that "the Wild White Forest breed, though reared for ages in parks in the West of England and Scotland, never assumes the character of the Long-horned race." The Shorthorn, on the other hand, no doubt derived its characteristic form of horn from its imported Continental ancestors.

The Longhorn does not stand attempts at improvement by crossing. Its peculiar characteristics will not admit of assimilation with other breeds, but it is calculated to "form a heavy hybrid: for example, the Earl of Radnor's cross-bred

Longhorn-Hereford heifer, at Smithfield in 1847 gained, at two years eight months, the gold medal, as the best cow or heifer of any breed in the yard, being the youngest animal that obtained the gold medal for a term of over fifty years."

In recent times "the breed has been in great demand for crossing with the Shorthorn, Aberdeen-Angus, North Devon, and Jersey." The female crosses prove to be good milkers, while the steers attain heavy weights of prime beef. At the Dublin Christmas Show in December 1903, Longhorn steers were reserved for first place in competition with Angus, Shorthorn, and Hereford rivals; and the previous year they got the second prize in a very strong class." Whatever may have been the character of the beef of the Longhorn breed in Bakewell's time, both butchers and consumers now agree that the quality is excellent.

As dairy cattle, they frequently produce from 14 lb. up to 17 and 18 lb. of butter per week on ordinary pasture. Good cows will give on an average about eight quarts of milk twice daily. Greater attention is now paid to them owing to the relatively higher prices given for milking cows, especially for cheese dairies, than for butchers' beasts. They produce more cream and curd from a given amount of milk than a Shorthorn; and all classes of them, except calves and cows in full milk, do better if kept in the fields all winter than in byres or sheds, and they cost less to winter than housed cattle.

The Longhorn influence on the dairy cattle of New South Wales may be gathered from Frank M'Caffrey's *First Century of Dairying in New South Wales* (Sydney & Melbourne Publishing Company, 1909): for example, on page 57 mention is made of "a very remarkable strawberry Durham bull," and the "Bally bull" of the Longhorn breed, and it is stated that "nearly every dairy herd of note between Bulli and Sholehaven River was based more or less on the progeny of these two bulls or from the matings of these bulls with other importations." The Longhorns, taken out in very considerable numbers in the early days, which materially aided in the establishment of cattle on the vast plains of Australia by providing hardy foundation-stock capable of resisting climatic and other difficulties associated with the breaking in of new country, are described as "brindled and yellow in colour, long frames, long heads with very long crooked horns of various shapes, large-sized udders and long teats. Some of the cows were strawberry-roan in colour, with white strips on the back and down the face." Again at page 207: "between 1830 and 1850 there was a very large percentage of Macarthur's Longhorns of the new type of Leicester breed among the dairy stock of Illawarra," and "no better cattle ever entered Australia."

The first volume of the *Herd Book*, with an historical preface by John B. Lythall, Bingley Hall, Birmingham, was issued in 1878; but during the eighties the breed was threatened with extinction, and the Agricultural Societies dropped it out of their premium lists. The tide soon began to turn in its favour. The Royal Show at Birmingham in 1898 was reopened to the breed; and the issue of vol. ii. of the *Herd Book* in 1900, with a preface by T. H. Weetman, the Hon. Secretary of the Longhorn Cattle Society, as one result of the success attained, followed by a third and then a fourth volume in April 1904, marked successive stages of a genuine revival of interest, based upon the recognition of the Longhorn's wonderful hardiness of constitution and other unique qualities for meeting present needs and what bid to be the requirements of the future. **A new Longhorn Cattle Society** inherited the first volume of the *Herd Book*. Present-day labour difficulties and narrow margins of profit call for a general-purpose animal which will rustle for itself and call for little attention. People begin to realise the fact that the advantages to be gained by high pressure and early maturity in high-priced times become reversed under a state of agricultural depression; and that the man who can utilise the natural pasture and other crude products of his farm to the fullest and best advantage is the man who produces at least cost per unit of produce and turns loss into profit. The all-important factor is time. The slow or medium maturity animals then become more valuable, and he reaps the benefit of the greatly increased tendency to fatten, which develops with age; and, in weight for age, the Longhorn is equal to any other breed. That the Longhorn possesses, in a conspicuous degree, the capacity of rapid fattening after maturity is reached, is further instanced by the record of "Moss Rose," a cow of W. H. Sale, Arden Hill, Warwickshire. This animal calved in March 1899, and after yielding about 50 lb. of milk daily, producing 2 lb. of butter, she was dried off in September. Not proving in calf, she was fattened and exhibited at Birmingham Christmas Show, when she scaled 17 cwts. 2 qrs. live-weight. "Rufus" (394), the bull which was first at Park Royal in 1904, weighed 25 cwts. when in ordinary condition. As an instance of the breed's acquired power of early maturity, a pure-bred steer, three years and three months old, bred and fattened by the Hon. E. A. Fitzroy, West Haddon, Northampton, was exhibited at Christmas 1905 in the Northampton Market, and took first prize and champion against all breeds. He sold under the hammer for £40. His live-weight was 19 cwts. 3 qrs., and the dressed carcase 173 stones (of 8 lb.), and he only received ordinary feeding till within the last nine months of his development. Breeders have paid rather more attention in recent years to animals of more early maturity, and classes for Longhorns are now included at each Birmingham Fat Stock Show, where in 1920 H. B. Parsons' first prize cow, weighing 19 cwts. at five years old realised £126, and in 1921 Swinnerton-Weston's first prize steer at three and a half years old, weighing 16 cwts. made £92, and W. H. Sale's first prize heifer at two and a half years old, weighing 11½ cwts., made £61.

There are now about 400 **registered Longhorn Cattle** in the country, descended from what were considered the best herds in the palmy days of the breed.

The **most prominent breeders** are:—

Stanes B. H. Chamberlayne, Witherley Hall, Atherstone; J. A. Frost, New Hall Farm, Sutton Coldfield, Warwickshire; Thos. Sammons Hands, Canley, Coventry; Frederick John Mayo, Friar Waddon, Dorchester; Sir F. A. N. Newdegate, K.C.M.G., Arbury Park, Nuneaton; Henry B. Parsons, Estate Office, Eastwell Park, Ashford, Kent; Hon. D. Partington, Westwood Park, near Droitwich; John Riley, Putley Court, Ledbury, Herefordshire; L. Riley, The Twerne, Ledbury, Herefordshire; William Hanson Sale, Arden Hill, Atherstone, Warwickshire; W. E. Swinnerton, Manor House, Over Whitacre, Birmingham; George Henry Tanser, Husbands Bosworth, near Rugby; J. W. Swinnerton-Weston, Over Whitacre House, near Birmingham; Alfred Wheeler, Chippinghurst Manor, Wheatley, Oxon.; Bertram Worrall, Steeple Aston, Oxon.

There is no export trade; but a **good demand** exists for bulls for crossing purposes, and for Longhorn females to form new herds. There is every indication that the breed will increase and become one of the standard general-purpose breeds of the country, and when its qualities are better known it cannot fail to establish itself in our cattle-rearing colonies and in other distant parts of the world.

The Hereford breed[1] is not only one of the most valuable and best known, but, owing to uniformity of colour and markings, one of the most picturesque of British breeds. The stronghold of the breed at home is in Hereford and the adjoining counties. All the highest authorities are agreed that, on at least one side of its descent, the Hereford is **closely connected** with other British breeds—such as the Welsh, the old Gloucester, the Devon, and the Sussex—which still possess certain characteristics in common with it; and notably the orange-yellow colour of skin and the medium length of horn. Tradition assigned some influence in the colour markings of the Hereford to cattle introduced from Flanders by Lord Scudamore in the seventeenth century, but recent scientific investigations into British and Continental cattle, with special reference to the formation of the skull, throw considerable doubt on this belief.

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[1] See Macdonald & Sinclair's excellent book, *The History of Hereford Cattle* (Vinton & Co., London, revised 1909).

The **improvement** of the breed began early in the eighteenth century. One of the earliest instances of a will in which cattle are named, that of **Richard Tomkins** of New House, King's Pyon, Herefordshire, yeoman, who died in 1723, and left to his son Benjamin (born 1714, died 1789, generally known as "the Elder"[1] to distinguish him from his son), "the cow Silver with her calf." Richard Tomkins had a numerous family, the sons, with one exception, setting up as farmers, and the only daughter marrying a farmer. Benjamin occupied the Court House Farm, Canon Pyon, from about 1738, marrying in 1742. The second son of this marriage, born in 1745, was Benjamin, known as the Younger. The father took Wellington Court in 1758, and soon after relinquished the Court House Farm to his elder son Thomas, Benjamin going with his father to Wellington Court, but removing to Blackhall Farm, King's Pyon, on his marriage to his cousin in 1772. Benjamin the Younger subsequently acquired Brook House Farm, King's Pyon. After his father's death in 1789 he removed to Wellington Court, and to Brook House in 1812, where he died in 1815. The father and the two sons thus at one time occupied four farms aggregating some eight hundred and forty acres, and there can be no doubt that they worked closely together in improving their cattle until the father's death in 1789. The younger Tomkins considered that the first marked improvement in his stock was due to the "**Silver Bull**," a red bull with a white face, out of a cow "Silver" said to be descended from the cow of the same name mentioned in Richard Tomkins's will.

It has been said that Benjamin the Elder adopted the system of "in-and-in breeding." Though in-breeding must have been practised to some extent in order to fix the type, all we can say with any degree of certainty is that there were three distinct colour types in the Tomkins cattle, and that the bulls used were bred in the herd. As father and son must have owned a considerable number of cattle, this could easily be done without close in-breeding. The cattle belonging to Benjamin Tomkins the Elder were undoubtedly much sought after, and were the source from which other early improvers got their stock. Tomkins the Elder was an intimate friend of **William Galliers** (born in 1713), of Wigmore Grange, who founded a well-known herd.

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[1] Much confusion has arisen owing to both father and son bearing the same Christian name. Macdonald & Sinclair show the inaccuracies arising from this cause in Prof. Low's *Domesticated Animals of the British Isles*, 1845.

Contemporary agricultural writers can be quoted in confirmation of the conclusions arrived at. Thus **William Marshall** wrote in 1788: "The Herefordshire breed of cattle, taking it all in all, may, without risque, I believe, be deemed the first breed in this Island," and stated that, in attending the October Fair in that year at Hereford, he saw about a thousand head of cattle, "the most valuable collection I have met with out of Smithfield, by much the finest show I have anywhere seen." He describes the characteristics of the breed, colour and markings being "a middle red with a bald face, the last being esteemed characteristics of the true Herefordshire breed." The date of this description is important in establishing the fact that the breed had been improved and the type fixed when Benjamin Tomkins the Younger was only forty-three years old. There can be no doubt that it was the work of his father and others, for many years back, which made Marshall's praise possible.

The attention given to our native breeds of cattle and sheep, resulting from the enclosure of common lands and the consequent development of agriculture, was making progress throughout the country. Whereas Benjamin Tomkins the Elder was born in 1714, Richard Bakewell, the famous improver of Longhorn cattle and New Leicester sheep, was not born until 1725, and Charles Colling, whose name with that of his brother Robert, is so indissolubly connected with the improvement of the Shorthorn, was Bakewell's junior by twenty-five years. The claim that Herefords were the **first improved breed** of cattle in these Islands is thus seen to rest on substantial grounds.

Another index of the point which improvement in these breeds had reached, is that of **sales of improved stock.** The first recorded sale of Herefords, held on 15th October 1795, was that of John Galliers of Wigmore Grange, the son of William Galliers previously mentioned.[1] In 1816 the sale held by John Price of Ryall brought an average of £56 for one hundred and sixteen head. The next important sale was that of a part of the herd of Benjamin Tomkins the Younger in 1819, four years after his death, when twenty-eight head, including calves, averaged £149. These prices compare with those of Charles Colling's sale of Shorthorns in 1810, when forty-seven head averaged £151, one animal "Comet" fetching 1000 guineas; and those of Richard Colling's sale at Brampton in 1819, when sixty-one head averaged £128, followed by his sale in 1820 when the average for forty-six head was only £49.

The **foundation of Agricultural Societies** is yet another

[1] This is the second sale of any breed we have found recorded (see p. 97).

indication of the new spirit which animated farming at the close of the eighteenth century, and did much to foster the improvement of our native breeds. Among the earliest of these societies was "The Agricultural Society of Hereford," founded in 1797, one of its projects being "to carry the breed of cattle and sheep as to carcase and fleece to the greatest points of perfection." **Annual Shows** began to be held and attracted exhibitors of the breed from all over the country.

Prominent amongst those who outlived Tomkins and carried on his work, was **John Price of Ryall,** who, buying his foundation stock from Benjamin Tomkins, was not only a most successful breeder, as may be seen from the average obtained at his sales, but seized every opportunity to bring the merits of the breed before the public by challenging other breeds, a practice then much in vogue. Only two years previous to his death in 1843 he had a third sale, at which ninety-nine animals averaged approximately £54. Another famous name in the building up of Hereford cattle is that of **William Hewer**, and his son **John Hewer** who died in 1873 at the age of eighty-six. It has been said that it is difficult to find a single animal of note that does not inherit Hewer blood.

The influence of the Hewer cattle, traced back to "Silver" (540), calved in 1797, was exerted upon surrounding breeds by the system of letting out bulls. Though, as we have already seen, the **prevailing colour** was red with white markings, the early improvers rightly treated colour as a secondary consideration. When the more essential characteristics, such as early maturity and hardiness of constitution had been fixed, the colour controversy became acute, John Hewer being a strong adherent of the red with white face, the other colours being red with ticked or mottled face, and grey and light grey. The controversy gave an opening to writers partial to other breeds, of giving their readers the impression that the red with white face was quite a new breed of Herefords. Thus in 1835, four years before the first show of the Royal Agricultural Society, a time when great interest was being shown both at home and on the Continent in the improvement of cattle, **Youatt** wrote, in *Cattle, their Breeds, Management, and Diseases:* "The old Herefords were brown or red-brown, with not a spot of white among them. It is only within the last fifty or sixty years that it has been the fashion to breed for white faces. Whatever may be thought of the change of colour, the present breed is certainly far superior to the old one."

Comments in the Agricultural Press of the day form a reliable guide to contemporary opinion on Herefords. Thus

The Farmers' Magazine for 1838, in referring to a pamphlet by the Rev. H. Berry, entitled "Improved Shorthorns: Their Pretensions stated and Their Value for General Purposes placed in Competition with the Improved Herefords," makes the following comment: "The facts and observations set forth in this publication are extremely interesting and have gone far to shake the opinions of many who had been accustomed to regard the Hereford breed as the *ne plus ultra* of profitable stock." Though Youatt, as we have seen, was not partial to the breed, his book shows that Herefords were at that time firmly established in fifteen English and Welsh counties.

The names of some **prominent breeders** of the early days are of interest: The Duke of Bedford, Lord Talbot, Sir F. Lawley, Bart., Sir F. Goodricke of Studley Castle, Lord Essex, The Rev. J. R. Smythies, E. F. Welles, Lord Plymouth, Lord St Germans, The Earl of Radnor, Capt. Peploe, Jellicoe of Beigherton, Thomas Andrew Knight, Sir Henry Hoskyns, Sir John Cotterell, Lord Berwick.

The "Herd Book" was begun by T. C. Eyton, Donnerville, near Wellington, Salop, in 1846, the first volume containing pedigrees of 551 bulls, many of which were calved in the early years of the eighteenth century, and one at least, in the latter years of the seventeenth. The work was purchased by the Herefordshire Agricultural Society and published under the editorship of Thomas Duckham, to whom at this critical time Hereford breeders owed much. In 1876 the **Hereford Herd Book Society** was founded, to purchase the copyright and continue the publication, which at that date consisted of nine volumes. In 1883, when the fifteenth volume had been published, it was agreed, in order to maintain the purity of the breed, that in future no cattle should be entered in the *Herd Book* unless their sire and dam had already been registered. The latest volume contains the pedigrees of 1265 bulls, and the produce of cows entered under each breeder's name. Compulsory notification of birth within a month of calving has recently been adopted, together with tattooing for the purpose of identification. **Three Sales** are held in the spring of each year. At these sales in 1919, 310 bulls were sold at an average of £110, 4s., the highest price, £1627, 10s., being realised by "Bounds Ideal," bred by Weston & Sons of Much Marcle.

The following are **records** of some **famous bulls** in the middle of last century: "Sir David" (349), calved in February 1845, bred by David Williams, Newton, Brecon, by "Chance" (348) out of "Duchess," also by "Chance," had a wonderful career both in the show ring and as a sire. While "Sir David" went to the well-known herd of Edward Price, Court House, Pembridge, one of his sons, "Sir Benjamin" (1387), was at the head of Benjamin Rogers's herd at The Grove. Another bull tracing back to "Sir David" was "Horace" (3877), calved in 1866, who was saved from the butcher's block by the genius of John Price, the son of Edward Price. "Horace" was the sire of "The Grove 3rd" (5051) sold, for export to America at Philip Turner's famous sale in September 1883, for £850, a record price at that time. "Horace" was a most prepotent sire, and his descendants were noted for having extraordinary mellowness of skin, and flesh of the best quality. "Lord Wilton" (4740), calved 1873, knocked down at the Stocktonbury Sale in August 1884 for 3800 guineas to the agent of an American purchaser who failed to complete his bargain, and subsequently sold to two local breeders for 1000 guineas, was by "Sir Roger" (4133), a son of "Sir Thomas" (2228).

Previous to the eighteenth century, Herefords were chiefly famous as **draught oxen**. With the growth of manufactures, there sprang up a demand for cattle maturing at an early age. The **Smithfield Club**, which held its first exhibition in 1799, gave an impetus to the production of beef cattle, and the merits of Herefords as beef producers were clearly proved at these Shows.

Sir Brandreth Gibbs, in his *History of the Smithfield Club*, gives the following statistics of prizes won for oxen or steers during the period when all breeds competed together, from the years 1799 to 1851 :—

	No. of Prizes.	£	s.	d.		No. of Prizes.	£	s.	d.
Herefords .	185	2758	2	0	Sussex . .	9	178	10	0
Shorthorns .	82	1399	5	0	Longhorns .	4	89	5	0
Devons . .	44	622	10	0	Cross Breeds .	8	108	5	0
Scotch . .	43	500	15	0					

An interesting feeding experiment conducted at Woburn in 1828-29 by the Duke of Bedford, on three Herefords and three Shorthorns, proved that the Herefords were by far the more economical beef producers.

Since the end of the eighteenth century, the **October** and **February Fairs** at Hereford have been attended by graziers from all parts of the country, the "whiteface" being a prime favourite in the grazing counties, as well as in the arable districts where cattle are fattened during the winter months. The beef, nicely mixed with fat and lean, commands top prices, frequently a halfpenny more than that of most other breeds.

A **special feature** of the breed is its freedom from **tuberculosis**. The Hereford bull is claimed to be the most prepotent sire of all our common cattle: and ranchers have found that fewer stock bulls are required for a given number of cows. The cows are splendid mothers and good breeders, continuing to breed up to an advanced age.

The hardiness that enables the Herefords to travel long distances if need be in search of food and water, together with their natural aptitude to fatten at an early age, has gained for them a world-wide reputation as the best ranching cattle. The hide of a Hereford is thicker and commands a higher price than those of other breeds.

Recent prices have been on a high level. At the Dispersal Sales in the autumn of 1918, 569 animals realised £118,170, 3s., an average of £207, 13s. 7d.—the highest of any breed. Amongst the best prices realised were £9450 for the four-year-old bull "Ringer" (31920) by "Starlight" (28754) at Hayter's Dispersal Sale; £2200 for a cow; £2205 for a bull calf; £903 for a two-year-old heifer; £714 for a yearling heifer, and £609 for a heifer calf. At the Herd Book Society's Bull Sales held in the spring of 1920, 370 bulls were sold for £46,082, 8s., or an average of £124, 10s. per head.

During the year ending 30th June 1920, 615 Herefords were exported to the following countries:—Uruguay, 321; Brazil, 158; South Africa, 87; Argentine, 45; Australia, 3; New Zealand, 1. The total number exported in 1920 was 682.

Herefords **as milkers** have never been in the first rank, and they have not hitherto been classed as dairy cattle. The practice of allowing the cows to suckle their calves has prevented the improvement of the breed by the artificial selection of the best milking cows from which to breed bulls.[1]

That the breed possesses excellent milking qualities has been fully demonstrated by Wm. J. S. White, Zeals Park Farm (700 acres), Wiltshire, whose cows are hand milked—the calves being taken away quite young. The herd was founded in 1819 by Robert White, great-uncle of the present owner. In the Dairy Herd Competition of the Royal Counties Agricultural Society at Bournemouth in 1905, the herd gained the third prize against eighteen opponents, and was noticed in the Official Report as follows: "W. J. S. White exhibited 74 of the best Hereford cows your judges had ever seen, and with an aptitude to milk seldom found in this very handsome and fine grazing breed. The cows are of a uniform type, large, and in high condition (though only moderately kept), and are evidently good milkers, with well-shaped udders. Your judges had much pleasure, mixed with surprise, at having to award a 'Dairy prize to a Hereford herd.' The herd increased in recent years to 90 cows in 1921."

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[1] A similar difficulty to that already recorded of the non-pedigree milking Shorthorn breed of the North of England (page 90).

"When starting the herd, Robert White selected animals from the most eminent breeders of the day, choosing those known to be from a good milking strain. Additions to the herd were made from time to time, among them being Quickset, purchased at Thomas Roberts's sale at Ivingtonbury; and Queen of the Arrow by Torro, a son of Lord Wilton. In 1897 the cow Prettyface and her bull calf Prince Brunswick (19654) were purchased from John Tudge, of Duxmoor. This cow was noted for her immense milking propensity, producing no less than 7 gallons of milk per day. She is also the dam of Prince Edward (20936), and through him is the grand-dam of practically all the cows now in the herd, and has transmitted to her progeny her own remarkable milking qualities.

"White spared no trouble or expense in obtaining first-class sires. Among those who have left their mark in the herd are Hero (2040), bred by the late T. Edwards, of Wintercott, and Helianthus (4641), bred by the Earl of Southesk, by King of the Lilies, who was used for three years, and got some wonderfully good stock. He was of immense size, weighing 3024 lb. at ten years old, and it is to a great extent through him that the herd is so good for milking, his progeny invariably being heavy milkers, yet having plenty of good flesh and an aptitude to fatten. Justice (5404) was bred by J. D. Allen, of Tisbury, Wilts, by Palmerston, out of that famous cow Queen of the Lilies. Queen of the Lilies was bred by the late J. Rea, of Monaughty, and was sold to J. D. Allen, who again sold her at the Southampton meeting of the Bath and West of England Show to the Earl of Southesk. She won numerous prizes at all the leading shows, including the Royal at Manchester, and was considered to be the best cow of her time. She was also the grand-dam of Helianthus. Lord Salisbury (12297), bred by W. Thomas, The Hayes, Cardiff, and Bransdale (17136), bred by A. E. Hughes, of Wintercott, were also used for a number of years." In more recent times the bulls in service have been Prince Charles (23681), bred by M. W. Price of Pipton, Breconshire, which sired Obdurate (44 p. 919), first at Shrewsbury Royal in 1914 for the best milking Hereford cow; Eaton Garnet (26085), bred by Captain C. Pulley, Lower Eaton, Hereford, left some big cattle; Loon (28423), bred by G. A. Darisy of Byford Court, Hereford; Vern Lictor (30169), bred by T. P. Smith, The Vern, Bodenham, Hereford; Twyford Astronomer (31127), bred by S. C. Hayter, Twyford, Pembridge, Hereford, got some good milking dark red cattle of big scale, and was finally graded to fetch £80. The last four bulls were three years in service in the herd. Merry Ben (31747), bred by P. E. Bradstock, Garford, Hereford, left excellent milking stock noted for docility. Vern Lictor (30169) sired "Unknown," the cow from this herd awarded first at the Salisbury, Bath and West of England show in 1920. Twyford Hotspur (31133), the 1921 stock bull, was bred by S. C. Hayter, and secured at his sale. He was got by Ringer (31920), sold for the record price of 9000 guineas at the same sale.

The following is a **description of the Hereford**, supplied by W. G. C. Britten, Secretary of the Hereford Herd Book Society. The *body colour* is a rich deep red; head to posterior side of horns, crest, brisket, and under parts of the body pure white. The *eyes* are occasionally surrounded with a red marking which is not objected to by English judges and is in favour in some countries, especially where exceptional heat and strong sunlight are experienced. The *bull* should be of masculine appearance and possess plenty of bone and substance. *Head*—moderately short; forehead broad, with horns springing straight from the sides of the head and slightly drooping, and of wax-like appearance, black tips to the horns being considered objectionable; muzzle broad and clear flesh colour; eyes very full and prominent. *Throat*—clean with slight development of loose flesh underneath. *Neck*—thick, with well-developed crest. *Shoulders*—sloping, but lying well open at the top between the blades. *Chest*—wide and deep. *Bosom or Brisket*—standing well out between and in front of the legs. *Body*—thick, deep; top and underline straight; ribs well sprung; buttocks broad; hip-bones well covered and not prominent; flank full and soft. *Tail*—neatly set on and evenly filled between the setting of the tail and hip-bones. *Legs*—short, straight, set well apart; lower thighs well developed and coming down well meated to the hocks; strong, clean bone. *Flesh*—firm and mellow to the touch and free from patchiness. *Skin*—thick, yet mellow to the touch and well coated with an abundance of thick, soft, curly hair, very silky to the touch. *General Appearance*—sprightly and of a gay carriage and masculine.

The *cow* should be altogether more feminine in appearance; head and neck less massive, the eyes denoting a placid and docile character.

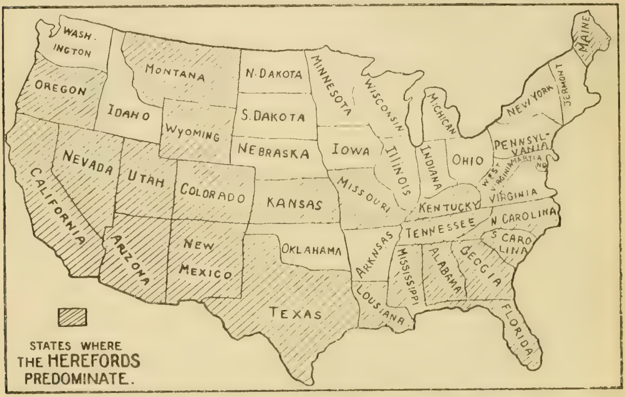
A few characteristic features call for special mention. The Hereford thorax is considered perfect by the veterinary faculty, who largely attribute the breed's freedom from disease and aptitude to fatten to the exceptional space afforded for respiration. The "touch" and the quality of the hair are points to which breeders attach great importance.

Prominent Hereford breeders in 1922 were:—

D. P. Barnett, Walterston, Llancarvan, Cowbridge, Glamorgan; F. B. F. Bibby, Hardwicke Grange, Shrewsbury; L. Blakstad, The Priory, Clifford, Herefordshire; P. E. Bradstock, Freetown, Tarrington, Hereford; Sir John Cotterell, Garnons, Hereford (herd dispersal announced for 1922); The Earl of Coventry, Croome Court, Worcester; G. H. Drummond, Pitsford Hall, Northants; H. R. Griffiths, Little Tarrington, Hereford; W. H. Hall, Bidney, Leominster; J. A. Hill, Orleton Manor, Leominster; Capt. R. T. Hinckes, Mansel Court, Hereford; W. H. Jones, Brook Farm, Lyonshall; Mrs E. Medlicott, Court Farm, Bodenham S.O., Herefordshire; W. A. Newman, Lower Wickton, Leominster; C. & D. Ockey, Thruxton, Allensmore, Hereford; Stewart Robinson, The Ovals, Kington; W. Smith, The Leen, Pembridge; E. C. Tanner, Eyton-on-Severn, Shrewsbury; T. R. Thompson, Birchwood Hall, Malvern; C. H. Tinsley, Twyford, Pembridge; J. Walker, Knightwick Manor, Worcester; H. Weston & Sons, The Bounds, Much Marcle, Herefordshire; O. Williams, Crossways, Cowbridge, Glamorgan.

The Hereford has **established itself in** many of the most important **pastoral regions** of the world as a breed of primary rank. From all quarters comes a unanimous verdict of praise. The magnificent build and vigorous constitution of the animal enable it to face a wide variety of climates and to fatten on the natural herbage of almost any grass-growing country. The procreative potency of the bull and the gentle and maternal instincts of the cow are the subject of universal panegyric.

In the **United States** a determined band of men, who realised the superiority of the Hereford for the Western States, set out to obtain from the home of the breed some of the best cattle. As a result, in 1883, prices for the best cattle reached large sums, culminating in 3800 guineas for "Lord Wilton" at the Stocktonbury Sale.[1]



The Philadelphia Centennial Exhibition, held in 1876, where the show of Herefords created a great impression amongst Western cattlemen, gave a great impetus to the spread of the breed, not only through the Central Western States but over the range country west of the Missouri. The best qualities of the sires were transmitted to the native stock of the plains. The beef industry of the United States was revolutionised. The accepted type of the beef steer was changed from the 2000 lb. ox that required four to five years to fit it for market, to the "baby beef" type of to-day that supplies beef of a superior quality in fifteen to eighteen months. The cattle-producing capacity of the grazing sections of the country has

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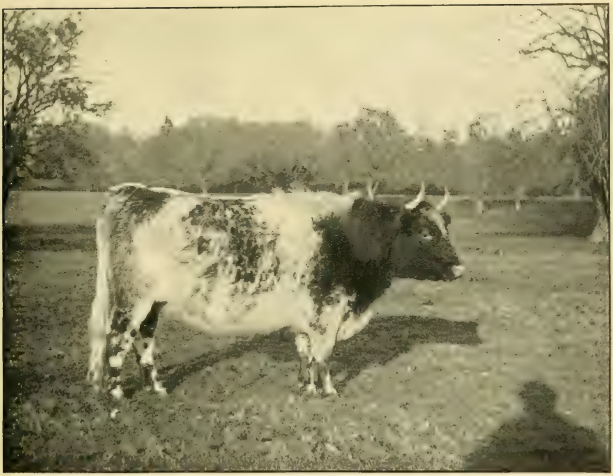
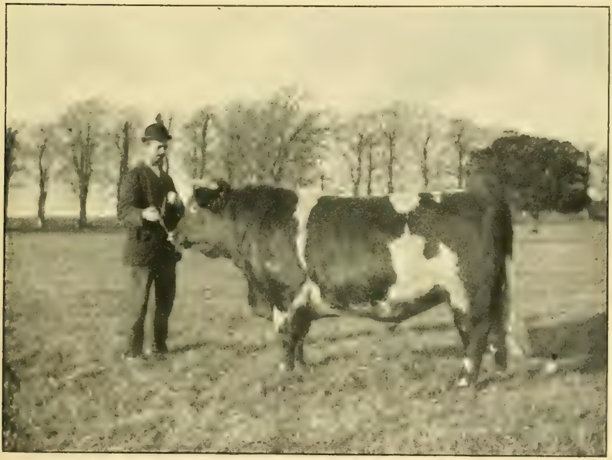
[1] For a full account of Herefords in America, see *The Story of the Herefords*, by Alvin H. Sanders, published in 1914 by the Sanders Publishing Co., Chicago, Ill., U.S.A.

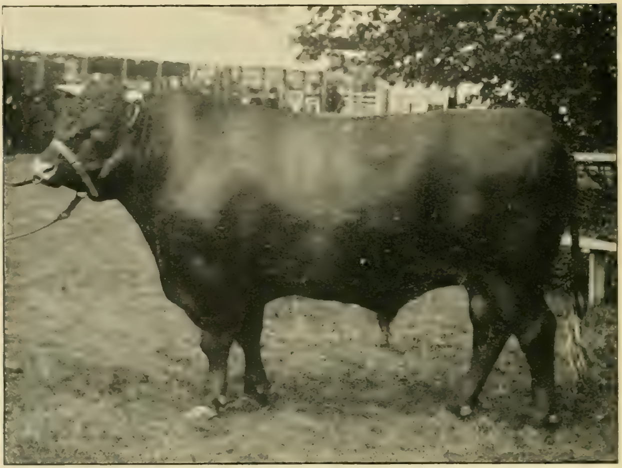


A. Dexter-Shorthorn Heifer.
Three years old. Five Crosses from a Dexter Cow by Shorthorn Bulls.

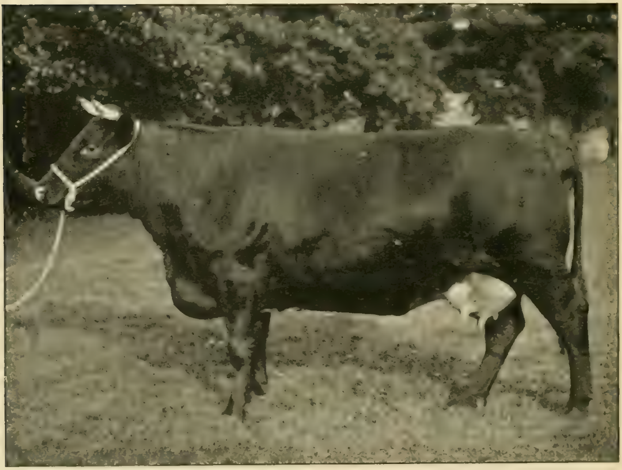


B. Dexter-Shorthorn Bull, "Tiny Tim."
Fifth Cross by Shorthorn Bulls from a Dexter Cow. Height at shoulder, 4′ ½″; length, shoulder-top to tail-head, 4′ 3″; girth, 7′ 3″; dewlap, 13″ from the ground.

PLATE XXVI.



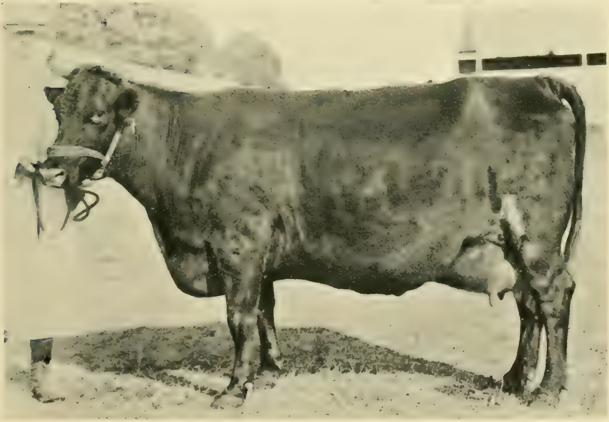
A. Lincoln Red Shorthorn Bull, "Weston Monarch II."
First, B. and W. Show, 1905. Owned by S. Crawley, Hemington, Oundle, Northants.
[*G. H. Parsons, Alsager, Cheshire.*



B. Lincoln Red Shorthorn Cow, "Stenigot Violet II."
Bred by R. & R. Chatterton.

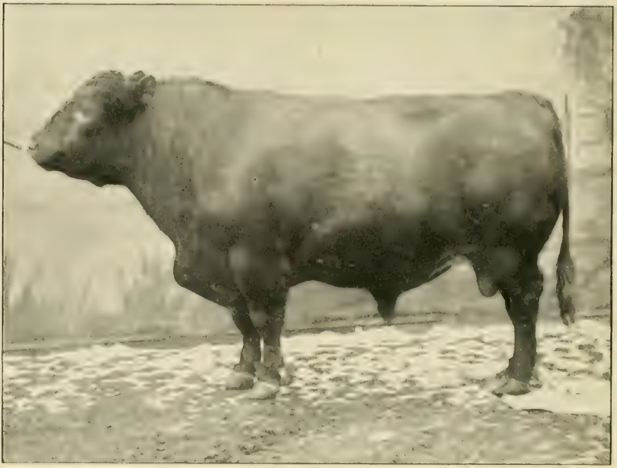
[*C. Reid, Wishaw.*

A. Lincoln Red Dairy Cows, belonging to J. Evans at Burton, near Lincoln.

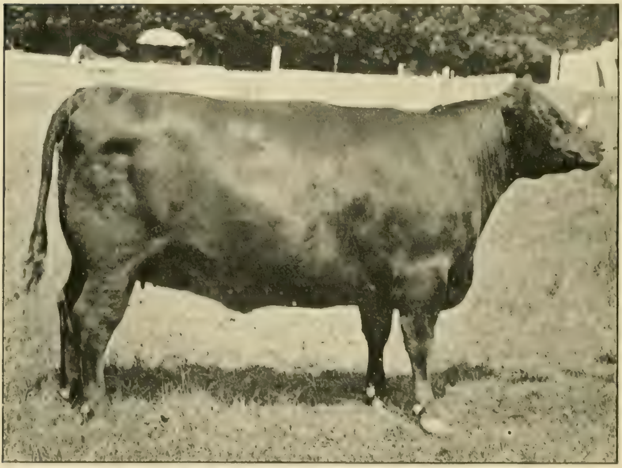


B. Lincoln Red Cow, "Burton Suttie II."
First, Milk Test, £50 Shirley Cup, Dairy Show, 1919. First, Open Dairy Class, Peterborough and Leicestershire. Third, Inspection; Second, Milk Test; Third, Open Shorthorn Butter Test, L. Dairy Show, 1921. Yield after 5th calf 1355 gallons.

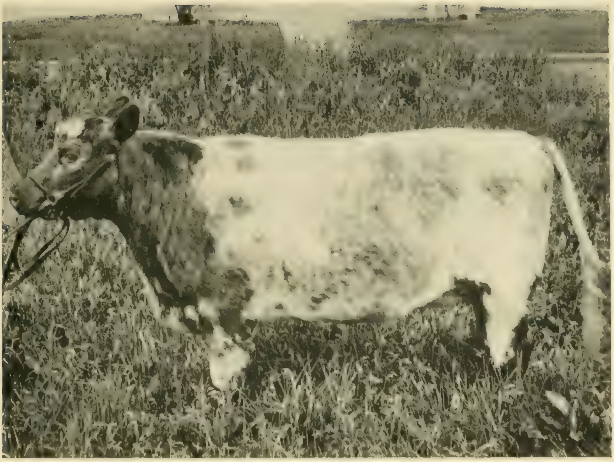
PLATE XXVIII.



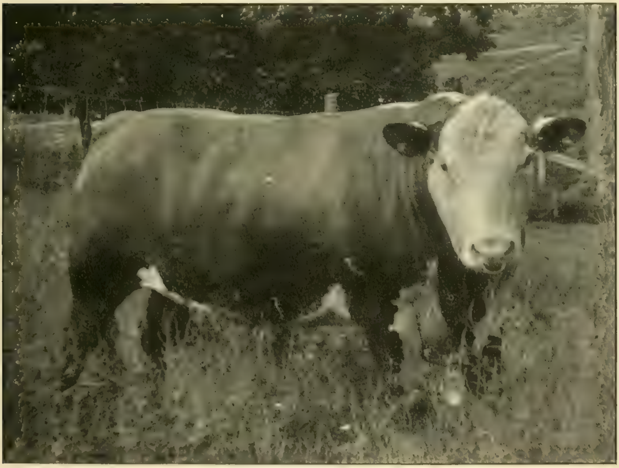
A. Polled Durham Bull, "Golden Hero."



B. Polled Durham Heifer, "Lorna."
Both the property of the Miller Stock Farm (J. H. Miller), Peru., Indiana, U.S.A.

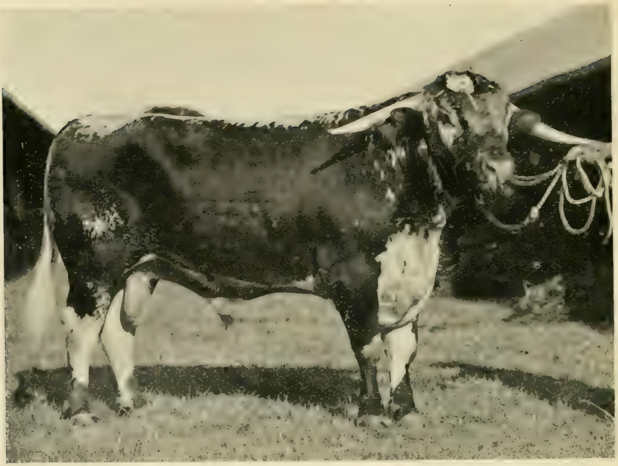


A. Polled Shorthorn Heifer.
The property of J. H. Miller, U.S.A.

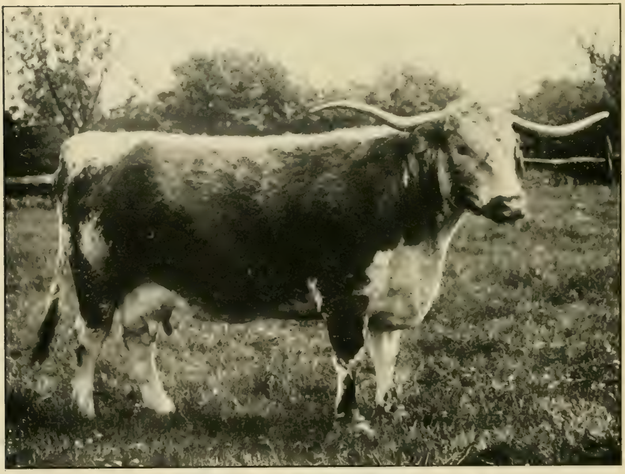


B. Polled Hereford Bull.
Owned by H. B. Arbuckle, U.S.A.

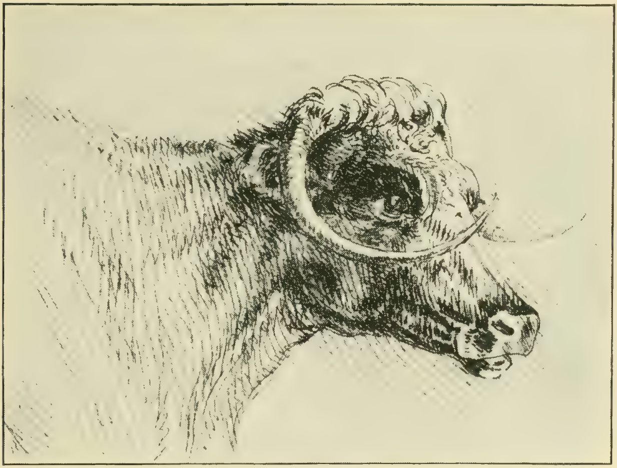
PLATE XXX.



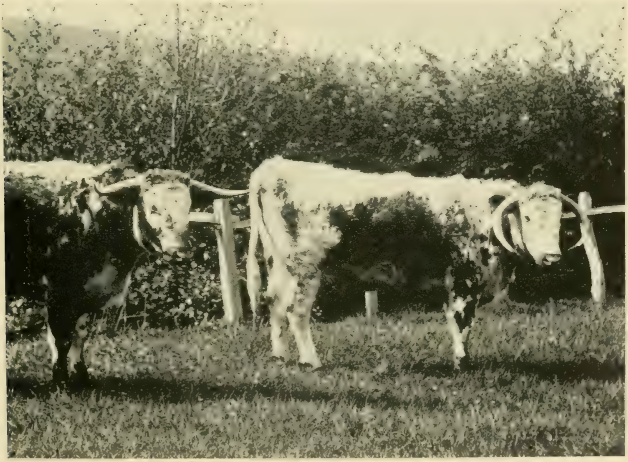
A. Longhorn Bull, "Arden Dreadnought." Born 10th May 1918.
Owned by J. L. & A. Riley, Ledbury.
First and reserve Champion Cup at Derby Royal.
[*"Agricultural Gazette Photograph.*



B. Longhorn Cow, "Daisy's Fairest and Best."
Winner at Royal and other Shows, 1903.
Owned by W. H. Sales, Atherstone.
[*G. H. Parsons, Alsager, Cheshire.*

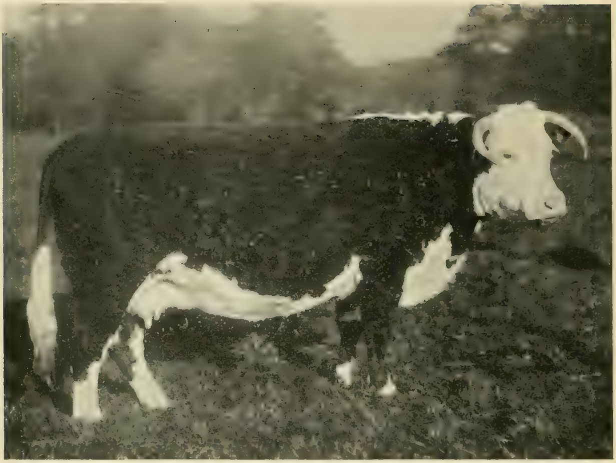


A. Lancashire Longhorn Head.
From Wm. Gilpin's "*Observations*," page 96.

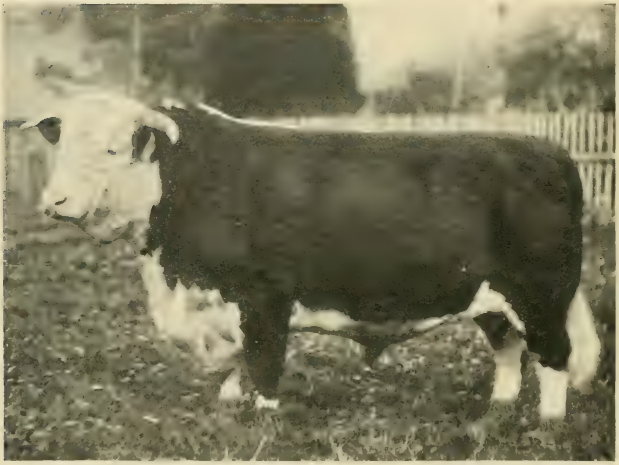


B. Longhorn Heifers, "Fradley Queen" and "Arden Lassie."
Famous prize-winners. Owned by W. H. Sales, Arden Hill, Atherstone.
[*G. H. Parsons, Alsager, Cheshire.*

PLATE XXXII.

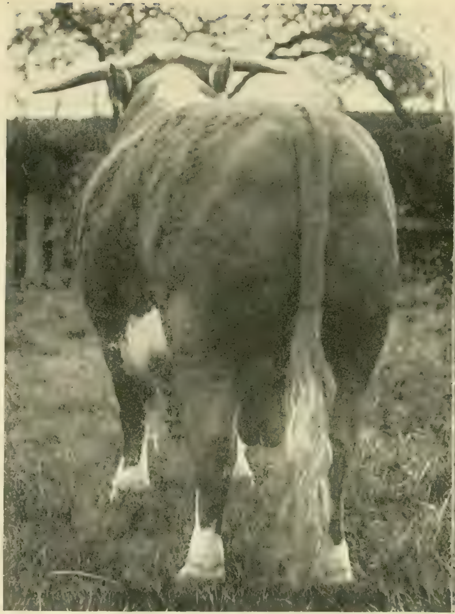


A. Typical Hereford Cow, "Oyster Queen," at 4 years old (v. 48, p. 658).
Fetched at Twyford Sale in 1918 £1785, and her heifer calf 400 guineas.
Bred by R. Bright.

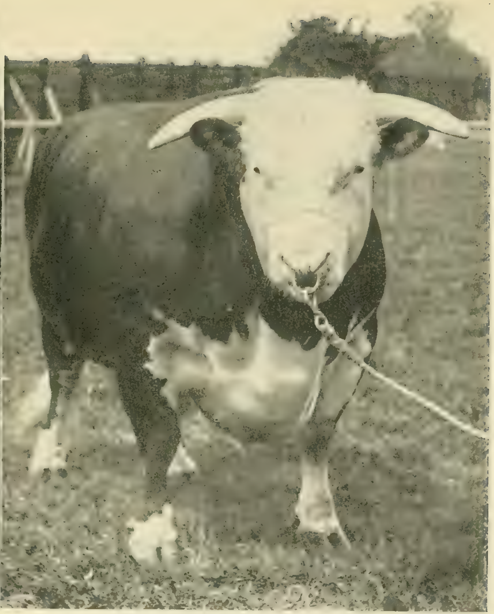


B. Hereford Bull, "Mansel Handyman" (33950), by Starlight out of Dame of Hirondell,
Champion H. & W. A. S. and Cup 1920.
Champion Royal Show, Cambridge. 1922. Bred by Captain R. T. Hinckes,
Mansel Court, Hereford

PLATE XXXIII.

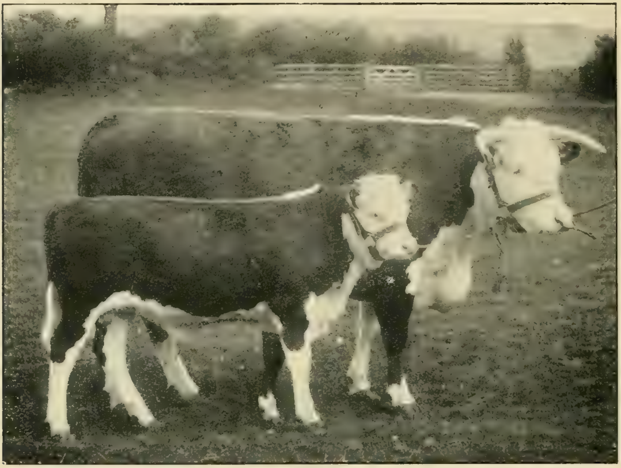


A. HEREFORD BULL, "BRIGADIER."
Owned by T. Smith, Moneton, Hereford.
Exported by Hughes in 1905.

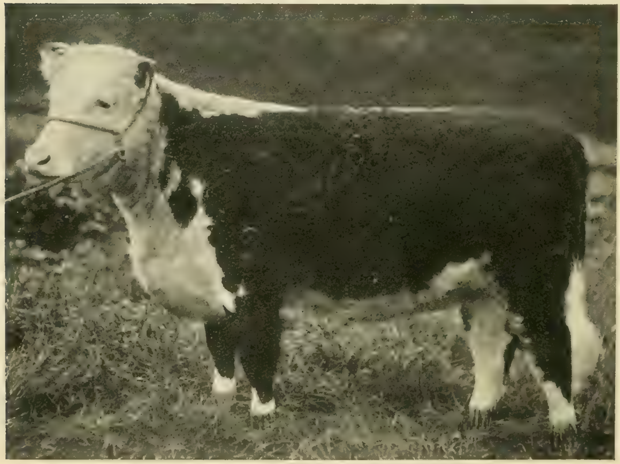


B. HEREFORD BULL, "ENDALE."
Champion at Hereford and Worcester. 1905.
Owned by Peter Coats, Sheepcote, Clifford, Herefordshire.
[*G. H. Parsons, Alsager, Cheshire.*

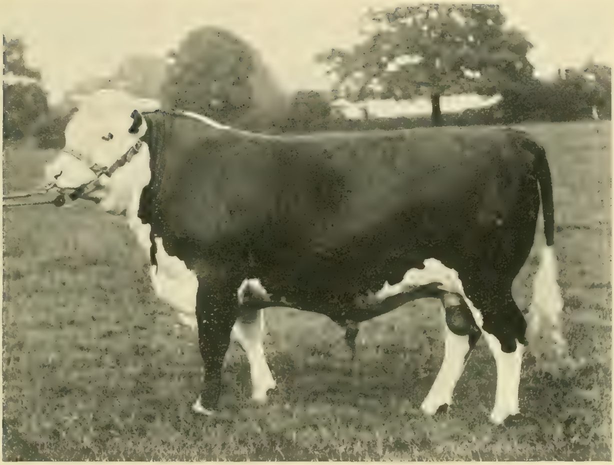
PLATE XXXIV.



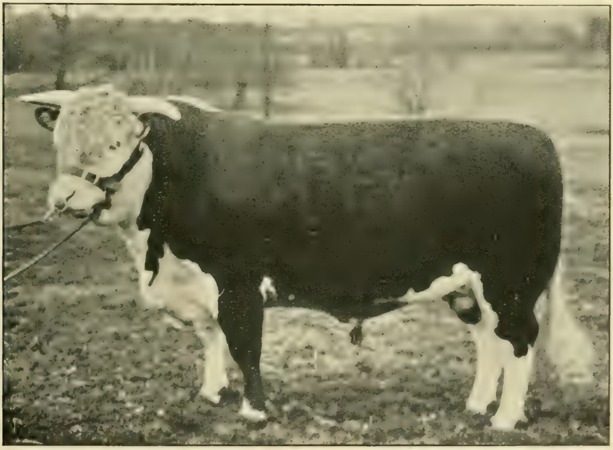
A. HEREFORD COW, "SHOTOVER," AND CALF, "ROYAL SHOT."
Champion Cow, Hereford, Worcester, and at the Royal, etc. etc., in 1904.
Bred by John Tudge, Duxmoor, Craven Arms, Salop.



B. HEIFER CALF (showing early maturity) "ELIZABETH" (v. 50, p. 467), age 10 months.
First at Lord Tredegas Show, Newport, 1919. Bred by G. A. Darisy of Byford Court.



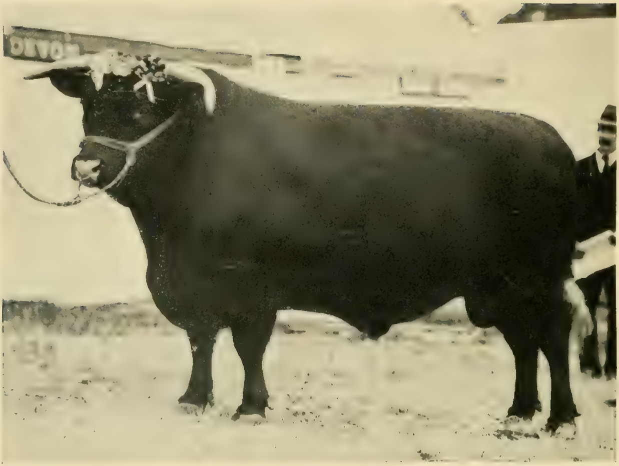
A. HEREFORD BULL, "ROYAL SHOT," at 1 year and 3 months, showing pigmented eyelids, indispensable for the protection of the eyes against the ultra-violet or X-rays of the tropical sun.



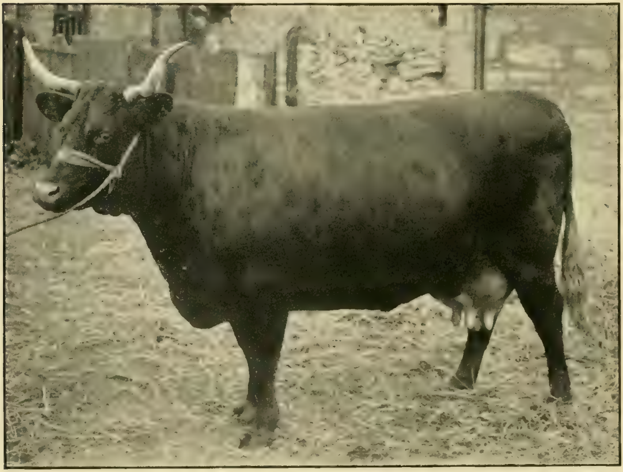
B. HEREFORD BULL, "ROYAL SHOT," at 2 years old. Mark his wonderful development and improvement in 9 months, especially in girth and in depth of thighs.

[*Photos by G. H. Parsons, Alsager, Cheshire.*

PLATE XXXVI.



A. DEVON BULL, "POUND LARKEN."
First, South Counties, First, B. & W., and Champion Bull, 1922.
Owned by G. C. Skinner, "Pound" Bishops, Lydeard, Taunton.
[" *Agricultural Gazette Photograph.*"



B. DEVON COW, "CURLEY 2ND OF POUND" (14771).
Eight months after calving. Special prize as best Devon, and Champion Dairy Cow
at Bath, etc. etc., 1905.
Bred by Alfred C. Skinner, Pound Farm, Lydeard.

been increased fully 50 per cent. The **American Hereford Cattle Breeders' Association** has 736,000 cattle registered, and fifty volumes of the *Herd Book* have been issued. In 1919, 96,873 calves were registered and 85,384 transfers or sales of registered cattle, were recorded in the Society's books.

"The American Government **census of pedigree cattle**, issued in 1921, is readily understood by studying the accompanying map. The shaded States are those in which Hereford cattle predominate over all other breeds.

"In the ranching State of Texas, where climatic conditions are severe, water scarce, and grass poor, the Hereford has it all his own way, there being 70,000 Herefords, 4000 Shorthorns, and 2000 Angus, showing the superiority of the Hereford as a ranching breed.

"As recently as 1880 Volume I. of the *American Hereford Record* contained only 2915 cattle. To-day the figures of the census show:—Shorthorns, 416,980; Herefords, 405,582; Angus, 108,512.

"The Shorthorns were well established in America before the Herefords. At the New York State Fair in 1842 there were thirty exhibitors of Shorthorns and only two of Herefords. To-day there are only 2.8 per cent. more Shorthorns than Herefords in the whole of the U.S.A."—From the *Hereford Times*, Oct. 22nd 1921.

Herefords have frequently won the Grand Champion of the Chicago Live Stock Exhibition for the best steer, as well as numerous prizes for best car lots. A special journal, *The American Hereford Journal*, is published fortnightly.

The **success of recent imports**, both as prize-winners and sires, goes far to show that American admirers of the breed cannot afford to do without British stock. Among notable bulls recently imported are "Farmer" (H.H.B. 29095: A.H.R. 426279), "Mansel Boy" (H.H.B. 28465: A.H.R. 426280), both bred by Capt. R. T. Hinckes, Mansel Court, Hereford, and "One Royal" (32871), renamed "His Majesty" in the States, bred by W. Griffiths, Alder's End, Tarrington, Hereford.

In Canada, also, the breed has made great progress. The Canadian Hereford Breeders' Association, Ancaster, Ontario, has issued ten volumes of the *Herd Book* and has 33,604 cattle registered.

On the vast property in South America belonging to the **Liebig's** Extract of Meat Company, Herefords have had an extended trial. The Secretary of the Company stated in 1919 that they formed a large proportion of their 250,000 cattle and gave the best results in good natural pastures on the River Plate, and especially in Uruguay.

From Uruguay, W. J. Sloan of Blanes, Monte Video, writes: "Although other breeds have been, and still are being tried with varying results, the Hereford is best adapted to Uruguay."

In 1919 42 bulls were sold in Monte Video at an average of $4175 gold, or approximately £800 each.

Louis Misson, Ex-Director of the Bureau of Animal Industry of the State of San Paulo, **Brazil**, writes thus: "The Herefords for many years in the Southern States, but especially in Rio Grande do Sul, have given splendid results in crossing with the 'creole' or native breed. To-day the Herefords are the most numerous among cattle imported to South Brazil, especially from Argentina, and in nearly all the best farms the stock is composed almost exclusively of the Hereford cross-bred. Stockowners have found, however, great difficulty in immunising European cattle against the prevalent Texas fever, and even greater difficulty with stock imported from North America or the Argentine.

"In 1916 the Brazilian Government decided to favour the importation of Herefords. Letters from official sources show that the stock imported from Europe were much superior in quality to those coming from Argentina and Uruguay, and that a much lower percentage of them died during the period of acclimatisation, compared with those imported from Texas."

A **Brazilian Report** dated June 1919, on *Imported Cattle and their Acclimatisation*, by Manuel Paulino Cavalcanti, Director of the Posto Zootechnico Federal of Pinheiros, State of Rio de Janeiro, states: "Herefords turned out in camp in the cold months thrive on the dry native grasses, being especially partial to Catingueiro, *Melinis minutiflora*. They range widely, but generally avoid swampy ground. Herefords are not much affected by ticks or by gadflies, partly because in the hot season they prefer the open camp or the shade of river banks, and partly because, from their placid nature, they take less notice of these pests. Hereford cows are very prolific, the calf crop being about 68 per cent."

Similar reports are received from **Australia**. C. M. Rogers of Toorilla Plains, Rockhampton, Queensland, wrote in 1919 as follows: "Hereford bulls were first introduced on to this ranch in 1877, and as they proved superior in every way to any other breed tried before, we have continued their use. Hereford bullocks are well adapted to the 'freezers' idea, viz., carcases 620-750 lb."

Herefords have made great progress in **New Zealand**. The New Zealand Cattle Breeders' Association, founded in 1898, has published twenty volumes, the latest containing records of fifty-seven herds. At a recent Dispersal Sale, the imported bull "President Wilson" (32951) was purchased by Frank Moore, Bushy Park, for £2220.

Throughout the **Union of South Africa**, and in **Rhodesia**, Herefords have done well. Jos. Smith & Sons, Val Station, Standerton, Transvaal, testifies:—

> "Our farms are situated in the high veldt of the Eastern Transvaal, altitude nearly 6000 feet. We have as a rule a very cold and trying

winter. The country is generally flat, without any shelter or windbreak, except where belts of trees have been specially planted.

"Our Herefords live out in the open both summer and winter, and are never stabled (except the imported bulls in winter). Feed is naturally provided by us in winter. Our grade cattle had been originally graded up from the Shorthorn ; but we can easily grow two Herefords for one Shorthorn on the same feed. The Shorthorn wants better country. Our summer grazing is excellent, but the winter is rather too severe for the Shorthorn, especially as they get better bred."

C. S. Jobling, Devonby, Bulawayo, the first winner of the **1000 guinea trophy** at Bulawayo with a Hereford against all breeds, writing in February 1918, states :—

"It is now thirteen years since I bought my first Hereford bull for grading purposes, and eight years since I started a pedigree herd. I would not feel justified in saying that the breed, or in fact any breed, was more suitable than others for Rhodesia, because it is a big country, with very widely varying conditions, types of country, class of herbage, etc. But I have had no reason to regret adopting the Hereford breed.

"I was born and brought up in the Shorthorn country in the North of England, and inherited a prejudice in favour of the Shorthorn. Over twenty years' Rhodesian experience has convinced me that only in very favoured spots will the Shorthorn do here. Not because there is anything wrong with the Shorthorn, but because the country is not good enough. We require something hardier. The Hereford compares favourably with any breed."

At the **Johannesburg** Fat Stock Show in 1919, Jobling won the £100 Prize for the best group of five slaughter oxen any age or breed, with three-year-old Hereford grades.

The Hereford Breeders' Society of **South Africa** is starting a "**Herd Book**," the cattle previously being registered by the South African Government.

Origination of Polled Herefords.—In 1901, Warren Gammon, Des Moines, Ia., circularised the members of the American Hereford Cattle Breeders' Association, asking if any hornless "freaks" had ever appeared in their herds. Fourteen head of registered Herefords that had never developed horns were found and seven cows and four bulls purchased by him. All bred practically true to type. There could be no question as to their pure descent. It was found that the polled bulls mated with horned Hereford cows gave 50 to 75 per cent. of hornless calves.

A national organisation was formed about 1907, with a membership of five. In 1913 this had grown to 296, and the *Herd Book* then issued shows a total registry of over 4000 head. J. E. Green, Muncie, Ind., has been the President of this Association from the beginning. Up to 1911, the founder of the type, Warren Gammon, acted as Secretary, and was then succeeded by his son, B. O. Gammon, who estimated that there were then 5000 or 6000 head of these cattle in the country.

CHAPTER VI

CATTLE—DEVONS AND SUSSEX

The Devon Breed—Two Branches—**Devon**—Early History—Historians: Sinclair, Culley, Fraser, Marshall, Young, Polwhele, Lawrence, Parkinson—Period of Degeneration—Francis Quartly—Davy and Merson—Holkharn and other old Herds—Prominent Breeders—Somerset Type—**South Devon** or South Ham—Points—Origin and Milking Qualities—Prominent Breeders—**The Sussex Breed**—Points—As Work Oxen—As Steers—Introduced to Smithfield Club by Edward Cane—Fat Records—Low on their Geographical Position.

THE **Devon Breed** is primarily divided into—(1) Devons, and (2) South Devons.

The Devon is the original true and hardy type belonging to the elevated region in the north of Devonshire. As represented by the best specimens, this division of the breed is unsurpassed for compactness and symmetry of form. It is smaller than the Hereford and the Sussex, two breeds to which it is believed to be allied. The colour of the hair is whole red, with often conspicuous dappled markings on the sides; the skin is orange-yellow specially around the eyes and muzzle, but inside the ears more orange-red. A small patch of white hair was once a common marking in front of the udder of the cow or the scrotum of the bull. At times it extended till it reached the fore-legs, and it was recognised as corresponding to a limited extent with the white under-line of the distantly related Hereford. But diligent effort has well-nigh eliminated these markings in the breed of to-day. The white hairs are sometimes mixed with the natural red brush of the tail, and are also in patches on the body. The head is adorned, in the case of the female, with particularly elegant, creamy-white, sharp-pointed, black-tipped horns of medium length, having a good elevation at the junction with the head, and curving upwards. In the bull they are shorter in proportion to thickness, straighter, and less raised. The shoulder is specially neat and well formed, the barrel joining on behind with scarcely a depression at the region of the heart-girth—a defective point in many breeds. The quality of the beef is excellent.

The early history of the breed is lost in obscurity. What is known is focused by Housman and Sinclair in the *History of the Devon Breed of Cattle* (1893). Various hypotheses are there advanced: (1) that it may have been descended from the original domestic cattle of Britain, modified by an occasional *Urus* cross; (2) that, in common with the Sussex breed, it may have been an offshoot of the red **Salers cattle**—a French breed which strongly resembles the Sussex "in the horn and general character," and which, in crossing with the Devon, may have produced "a perfectly harmonious blending." This theory supports the contention of French writers "that the early Celts carried their famous breed of cattle with them into England," and that they were probably the origin of the historic red cow of the South of England from which a number of now distinct but allied breeds descended; (3) that they may have been a result, as was also asserted of the Hereford, of crossing the original cattle of the district with cattle from Flanders; (4) that they may possibly be traced back to the period of the landing of the Phœnicians in search of Cornish tin, and thus be of Spanish or North African extraction.[1] An Irish record exists which shows that the Devon cattle taken to the South of Ireland were at that time red in colour. One of the most complete of the early descriptions of the breed is given in **George Culley's** *Observations on Live Stock* (1794 edition), condensed by Sinclair:—

> "Devon cattle were then considered to be of the greatest purity and of the best kind in the vicinity of Barnstaple (but other writers add North and South Molton). They were there of a high red colour, white spots (particularly if running into one another), being regarded as signs of impurity. He described them as having a light dun ring round the eye, and the muzzle of the same colour, fine bone, clean neck, medium length of upward-bent horns, thin faces, fine chaps, wide hips, a 'tolerable' barrel, but rather flat on the sides, small and high-set tail, thin skin, silky handling, feeding early, maturing sooner than most other breeds; and by hardiness, quick movement, and the form of the shoulders, well qualified for use as working animals."

In the same year **Robert Fraser**, in his *General View of Devon*, remarks that the Devon breed is remarkably fine, and perhaps the best in the Kingdom, many people preferring it to the famous Longhorns of Bakewell.

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[1] Dr R. Munro, in *Prehistoric Scotland*, says there is a consensus of educated English opinion that there is no evidence of such a trade ever having existed, though the Phœnicians had for a long time a monopoly of navigation and trade in the Mediterranean. It is an interesting fact that the numerous cattle of the Islands of Andros and Tinos, and a few others in the Greek Archipelago, resemble Devon cattle, and when crossed with them yield progeny of a similar type. The breed is very ancient; the animals are light red, longer legged, and narrower than Devons. Their many defects are doubtless due to in-breeding from time immemorial.

William Marshall writes in 1796:—

"There are numberless individuals of the Devonshire breed so perfectly resembling the breed of Herefordshire, in frame, colour, and horn, as not to be distinguishable from that celebrated breed, except in the greater cleanness of the head and fore-quarters, and in the inferiority of size. The cattle of Devonshire resemble those of Sussex, except in their greater symmetry of frame, and their being much cleaner in the fore-end, and everywhere freer from offal, than the ordinary breed of Sussex." The breed "varies very much in different districts of the country, both in size and mould. North Devonshire takes the lead in both these particulars, and its breed is, in both, nearly what cattle ought to be. . . . They are beyond all comparison the best workers I have anywhere seen."

Arthur Young in the same year gives the most comprehensive account of the breed, from information derived from Lord Somerville. He thus, according to Sinclair, locates their home in North Devon, beginning at Barnstaple:—

"The length of the district to the western extremity, the mouth of the Barnstaple River, is 45 miles; the breadth, from Tiverton to Minehead, 22 miles. Outside this district eastward was a 'mixture of Gloucester, Welsh, Upper Somerset, etc. . . . a varied dairy sample.' Beyond the western extremity, the Devon breed was found, but inclined to the Cornish type. . . . To the south were the South Hams Cattle, described as 'coarse, with a good deal of white and brown, and black and white mixtures, of uncertain properties.' . . . At Bampton, in North Devon, and at Wiveliscombe, in Somersetshire, both low-lying places in a comparatively warm climate, the breed was in great perfection. . . . The north-west of Devon and the hill part of Somerset produced stock to the utmost of their capacities to supply the demand in the vales of Taunton and Exeter, and 'a great foreign demand,' which had been added by the merit of the breed. . . . Handsomer bulls are often to be found in other breeds, but they are the sires of oxen incomparably active in labour, full of that which in horses is termed 'blood,' and of that superior grain which gives Devon beef its high place in the market. . . . It is certain that this race, of which the *whole produce* is brought to view, stands the confessed favourite or among the very first at Smithfield, where 'prejudice cannot find the way. Generally speaking, the bulls are, relatively to oxen, not of a large size.' . . . The skin of the Devon is of the thinner rather than the thicker class, and the hair is seldom hard and wiry. . . . Great stress is laid upon colour, the mahogany shades being most admired. Those with curled hair are deemed excellent provers; and a very glossy skin, paler or lighter, with curls [*sic*], like ripples of wind on a smooth millpond, is also in the highest estimation. The paler shades, however, if the eye be good and clear, are second to none in bearing hard work and in proof."

The Rev. Richard Polwhele (1797) says of the Molton and Barnstaple cattle:—"These are the finest bullocks in the Smithfield market; they are a very healthy breed, and easily fed; they are fleshy, with small bones, and they 'bear the best weight' on the most saleable parts; they are of a cherry colour or bright red." As regards the wonderful prepotency of the bulls within the true home of the breed—a "space of about 15 to 20 miles in diameter"—he observes that, mated with Guernsey cows, they produce crosses indistinguishable from their sires, but that out of this space their descendants of the third or fourth generation show a falling off in quality. He herein expresses a very common but, as since proved, erroneous opinion of Devon people at the time, in face of his own declaration that "numbers of bulls are bought at high prices and sent even to Jamaica." He records the sale of a Devon heifer at 30 guineas, a price "frequently commanded" by the best bulls of the breed.

John Lawrence, in *A General Treatise on Cattle, etc.* (1805), discussing Devons, says:—

> "From these have descended the Hereford, Old Gloucester Red, and Sussex." . . . "The red cattle of North Devon are doubtless one of our" [earliest] "breeds, and one of those which have preserved most of the primitive form. The excellence of this form is best proved by the fact that the fashionable substitution of horses has made no progress in the district of these cattle, by their high repute as feeders, and by the superior excellence of their beef, which has been acknowledged for ages. Robert Bakewell paid them the highest compliment they could receive, by declaring to an enquirer that the Devons could not be improved by any alien cross. . . . These cattle have generally, for a century past [200 years from the present date], commanded the best price at Smithfield. . . . The Devons are the speediest working oxen in England, and will trot well in harness."

Richard Parkinson's account of the breed (1810) gives the colour round the eye and muzzle as "light dun." This strengthens the conviction that whatever breeds of cattle were drawn upon to form the true type of the Devon, the traditionary cattle brought by Cornish miners (page 117), played no insignificant part. The rings of light-coloured hair which have disappeared from the modern type of Red Ruby, but have been mentioned by several early writers, are a characteristic of certain of the cattle of the great European Peninsula that have indisputedly formed the foundation stock in North and South America and also in South Africa, where the breed is noted for hardiness and activity, and power of endurance in the yoke. The colour, as well as the head and forward part of the body, of the Africander cow is so Devon-like, that a belief exists, based on no trustworthy evidence, that the Devon breed must have contributed to its formation.

Two periods of degeneration in the Devon breed occurred during the first half-century of its written history, "at one time from selling-off the best cows, and at another time from feeding-off the best calves"; but they seem to have entailed no permanent injury upon the latter-day representatives.

Francis Quartly of Great Champson, in Molland, North Devon, filled the position in the history of Devon cattle which the Collings did among Shorthorns, and Tomkins among Herefords. Francis was the great-grandson of James Quartly, who migrated from Somerset in 1703; was grandson of Henry

Quartly, who died in 1725; and son of James Quartly (born 1720, died 1793), who had two other sons, Henry George, and William (a clergyman). These were all closely associated with the development and fame of the breed. Francis Quartly began his career as a successful breeder at a time, according to his own statement, when "the principal North Devon yeomen were all breeders, and every week you might see in the Molton markets animals that would now be called choice." Before 1831, when cattle-shows began at Exeter, there were no shows to test the relative merits of animals, and "the war-prices tempted many farmers to sell their best bulls and cows out of the district." Quartly saw that the breed was degenerating, and he "determined to buy quietly all the good stock" he could get. He continued thus for years (1793 to 1823) to "improve his stock till he brought it to perfection." The Champson herd thus became the fountain-head of the breed. Quartly practised the system of in-and-in breeding, using home-bred bulls, and purchasing females to improve his foundation stock. He retired in 1836, after forty-three years of activity as a breeder, in favour of his nephew, John Quartly, and died in 1856 at the age of ninety-two. The influence on the breed of the Quartly family may be gathered from the following quotation from **Sinclair**:—

> "Henry Quartly was the breeder of the celebrated bull 'Forester' (46), and of the cow 'Lily,' or 'Lilly,' the direct ancestress of James Davy's 'Temptress' (1672), the famous winner of the gold medal of the Battersea International Show; and of his not less excellent cow 'Actress.' . . . There are recorded in Davy's *Devon Herd Book* more animals tracing descent on the dam's side from Francis Quartly's long-horned 'Curly,' and Henry Quartly's 'Lilly,' than from any other two cows of the Devon breed."

William Davy, at Flitton, and **Merson**, at Brinsworthy, in whose families herds of Devon cattle had been maintained for more than a century, were intimately associated with the evolution of the breed. There were many breeders whose names were not recorded, as well as others whose names are known, who ought to share the credit of its maintenance and restoration.

One of the most famous of the early herds outside the county of Devon was that of **Holkham**, in Norfolk, founded in 1791 by Coke, created Earl of Leicester in 1837. From Holkham, Devons were first exported to the United States.

Breeders of **other famous old herds** who deserve mention were George Turner of Barton, who gained numerous medals and prizes (on two occasions at Paris); two generations of Mersons at Brinsworthy; W. M. Gibbs of Longlands, near Taunton, and his brother, George Gibbs, who held the adjoining Portman Farm, and whose herds were in the front rank from 1850-80; Walter Farthing of Stowey Court, near Bridgwater, who succeeded to his uncle's herd of seventy years' standing, and took many prizes for cattle bred from pure Devon bulls on large-framed Somerset-

Devon cows; Viscount Falmouth of Tregothnan, Truro, who had a herd of seventy-six animals, sold off in 1890 at an average of £61, 2s. 6d.; Bodley of Stockley Pomeroy, Crediton, who kept a pedigree record of his herd years before John Tanner Davy, himself a successful breeder, started the *Herd Book;* William Umber of Wappenbury, Warwickshire, who began in 1810, and was the first of a family of noted Devon breeders; John Tapp of Twitchen, Devon, who owned one of the oldest and best herds, although unknown in the show-ring; John Joyce of Allercott Farm, Timberscomb, Somerset, who, by the judicious use of Devon bulls, bred a herd of Somerset-Devons that "showed in an extraordinary degree the size and substance of the Somerset with the symmetry and quality of the Devon"—the herd of forty head averaging £38, 0s. 6d. at the sale in September 1875; the Webber family, of Halberton Court, who fortified their herd by the purchase of "Hundred Guinea" (56), and many other good sires, and took many prizes; W. H. Punchard, of Bourton Hall, Totnes, Devon, who blended the style and quality of the Devon with the great size and heavy flesh of the Somerset-Devon—one of the Myrtle tribe from the Pound herd, while in his possession, being declared the second best dairy cow at the London Dairy Show in competition with all breeds; the Cecil Smiths, father and son, of Lydeard House, Taunton, who gained many prizes, including one at the Paris Exhibition, with superior animals bred from the most fashionable strains of Devon blood; John Walter (proprietor of *The Times*), of Bearwood, Berks, who on several occasions gained premier positions at Smithfield, and in 1879 at the International Show at Kilburn; the Earl of Dartmouth, who had a herd at Patshull, Wolverhampton; and Edward Pope of Great Toller, Dorset, who inherited a herd which had been maintained in the family for at least three previous generations, and which carried off many prizes at the Royal, Bath and West, and Smithfield Shows.

The **most prominent breeders** of Devon cattle since the beginning of the twentieth century have been:—

H.M. King George following King Edward VII., at Windsor; H.R.H. The Prince of Wales, Duchy Home Farm, Stoke Climsland, Cornwall; L. H. Alford, Horridge, Ashford, Barnstaple, Devon; L. I. Baker, Wayford Manor, Crewkerne, Somerset; Wm. Brent, Clampit, Callington, Cornwall; Major A. Scott Browne, Buckland Filleigh, Highampton, Devon; Robert Bruford, Nerrols, Taunton, Somerset; W. T. Buckingham, Langkey, Barnstaple, Devon; B. J. Bucknell, Holcombe Rogus, Wellington, Somerset; Capt. M. L. Buller, Downes, Crediton, Devon; W. G. Busk, Wraxall Manor, Cattistock, Dorset; J. H. Chick, Wynford Eagle, Dorchester, Dorset; W. D. Chick, Compton Valence, Dorchester, Dorset; W. J. Chick, Stratton, Dorchester, Dorset; R. A. Clarke & Sons, Chiselborough, Stoke-under-Ham, Somerset; Eland Clatworthy, Cutsey, Trull, Taunton, Somerset; Lord Clinton, Heanton Satchville, Dolton, Devon; Robert Cook, Crazelowman, Tiverton, Devon; Henry Gillham, Long Run, Bishop's Hall, Taunton; William Greenway, Halse, Taunton, Somerset; John Gush, Rocknell, Burlescombe, Devon; C. L. Hancock, Cothelestone, Taunton, Somerset; H. C. Hancock, The Court, Milverton, Somerset; Mrs R. Donne Hancock, Blakes House, Halse, Taunton, Somerset; Wm. Haywood, Whitefield, Wivelscombe, Somerset; M. J. Kidner, Fennington, Taunton, Somerset; Samuel Kidner, Milverton, Somerset; Exors. of H. Kingsford-Lethbridge, Wood, Okehampton, Devon; A. T. Loram, Rosamondford, Aylesbeare, Exeter, Devon; H. G. Mayo, Corton, Dorchester, Dorset; F. J. Merson, Farringdon, North Petherton, Somerset; Charles Morris, Highfield Hall, St Albans, Herts.; Sir Edward E. Pearson, Brickendonbury, Hertford, Herts; John Pope, Nowers, Wellington, Somerset; Alfred Pope, Henstill, Sandford, Crediton, Devon; Viscount Portman, Bryanston, Blandford, Dorset; Lord St Audries, St Audries, Taunton, Somerset; G. C. Skinner, Pound, Bishops Lydeard, Somerset; T. W. Smith, Ford, East Downe, Barnstaple, Devon; Sir Harold Tagart, Northcote Manor, Chulmleigh, Devon; John Thorne, Gotton, West Monkton, Taunton, Somerset; A. M. Williams, Werrington Park, Launceston, Cornwall; F. J. Yendall, Upcott, North Molton, Devon. (See also Appendix E.)

The Devon breed is more a **rival** of the Hereford than of the Shorthorn as range cattle. They early established themselves on the heights of the New England ranges in **New South Wales**. They took the lead among British breeds of cattle in **Uruguay**, and they have, with their uniform and ample supply of pigment, established an unequalled reputation among imported European cattle in the Northern of the three **South Brazilian cattle zones** in the State of Minas, which lies immediately to the west of Rio de Janeiro. There Devon bulls, introduced for the improvement in beef production of the native "**Caraçu**," a superior foundation breed of Spanish origin, come into competition with the humped **Indian Zebu**, the bovine Negro which, unlike European cattle, has no acclimatisation difficulties to overcome, being at home in the tropics and practically immune from tropical diseases and tropical parasites. In the two more southern cattle belts—the Rio Grande, the largest and most important, abutting on the northern borders of Uruguay; and the other to the west of San Paulo—good progress has been made during recent years in the improvement of the native breed, in spite of the serious losses sustained by "red water" or Texas fever, *Pyroplasmosis*, among imported European breeds. "In the northern zones, Herefords and Devons have given good results, and the latter resist the heat better than other European breeds." . . . "Herefords and Devons have been largely and successfully used in the Rio Grande, nevertheless the general opinion seems to be that the Shorthorn is the best animal for crossing in this district once he has become acclimatised, but that he does not stand the heat like the Hereford or Devon."—W. T. STOCKLEY.

The type of Devons peculiar to Somerset has in recent years been coming to the front and growing in favour, on account of its large size, due to the richer and deeper soil and better climate prevalent in that region. With increase in bone, there is a tendency to coarseness of figure, and Somerset breeders strive to counteract this by using bulls reared in the north of Devonshire. A parallel example to this is to be seen in numbers of the Ayrshire breed reared away from their home conditions and highly fed. The horns of the Somerset type are more inclined to droop than those of the original Devon. There is a growing foreign demand for these cattle.

Being originally a hill breed, the Devon is hardy, strong, and active. It was long famous for supplying useful oxen for farm work, but its employment in this way is now much restricted. As a breed for **milk production** it has been gradually improving in recent years. Many dairies within the Devon area are composed entirely of Devon cows; and in Dorset, cows are (1919) annually "let" at up to £30 each. This points to the fact that Devons are, in addition to being one of the premier beef breeds, capable of holding their own as dairy cattle. Milk records taken during 1921 show individual cows yielding from 6400 lb. to 9909·5 lb. of milk (by "Nobbie") and first-calf heifers, under four years old, 4367 lb. to 7747 lb. during a lactation period.

Milk records are published in Davy's *Devon Herd Book*, commencing in vol. xli. Noted dairy herds of the present day are those belonging to W. G. Busk, Wraxall Manor, Cattistock, Dorset; J. H. Chick, Wynford Eagle, Dorchester, Dorset; W. D. Chick, Compton Valence, Dorchester; W. J. Chick, Stratton, Dorchester; R. A. Clarke & Sons, Chiselborough, Stoke-under-Ham, Somerset; A. T. Loram, Rosamondford, Aylesbeare, Exeter, Devon; H. G. Mayo, Corton, Dorchester; N. G. Lupton; L. I. Baker.

A heifer of Thomas Dyer of Tencreek, in 1905, gave 3½ gallons of milk daily, yielding 4·9 per cent. of butter-fat in the morning to 4·4 per cent. in the evening—an average of 4·65 per cent.—equivalent to 2 lb. of butter per day; and Wm. Kidner of Kingston had a cow which gave 1100 gallons of milk in eleven months. Milch cows retain their lean flesh well, and fatten into good beef "after dropping their fourth or even fifth calf."

The South Devon breed differs very materially from the Devon breed already described, South Devons being larger, coarser, and lighter in colour. They perhaps acquired these differences to some extent, and also their greater milking powers, by early crossing with the Channel Island and still more likely Normandy cattle. This, however, is by no means regarded as an established fact or accepted among South Devon breeders.

Youatt refers (1834) to the practice of crossing the English South Coast and Isle of Wight cows with Channel Island blood, but it is believed that the South Devon breed existed long before that time, probably as far back as 200 years before 1921:—

> "The dairy stock has been occasionally mixed with the Guernsey or Alderney cattle, and with success, so far as the quantity and quality of milk go . . . The Alderney is a favourite breed; a cross between it and the Devon has produced some very good cows, well adapted for the dairy, and not unprofitable for the butcher."

Since the end of the eighties of the nineteenth century, the South Devon cattle have been steadily asserting themselves as a distinct breed of outstanding merit. They have been growing in favour as general-purpose animals for the production of both meat and milk, and their development in type and quality has been a subject of remark at the leading shows. They have extended in considerable numbers into the counties contiguous to their home centre, and they have been shipped in steadily increasing numbers to South Africa, where very high prices have been obtained in recent years. Some very fine animals were exhibited at the Rand Show in 1922.

The principal object for which the South Devon Herd Book Society was formed in 1891 was "to maintain the purity and improve the breed of South Devon cattle," and the result of the zeal of the Council and members of the Society and of its first Secretary, Alfred Michelmore (who resigned in 1918), can be gathered from the fact that the exhibits of pedigree cattle at the Royal Agricultural Society Show at Cardiff in June 1919 created quite a sensation, not only amongst the many Colonials present, but also amongst other owners and breeders.

A writer in the *Mark Lane Express* in commenting on the South Devons at the Royal Show stated: "The South Devons are a unique breed . . . they cannot possibly have competitors as there is nothing else like them . . . a South Devon won at the Dairy Show against all breeds in the milking trials, and breeders tell me she was not an exceptional cow."

Another report states that all eyes were fixed on the prize bulls, which presented the appearance of "elephants" in the show-ring. The one which was awarded First Prize, "Worswell Perfection," is reported to be the finest specimen in South Africa, and is a noted prize-winner there. The bull which was awarded Second Prize (after having won First and Second at other shows), owned by J. Sparrow Wroth & Sons of Coombe, Aveton Gifford, was killed at Cardiff immediately after the show and weighed 18 cwts. 3 qrs. and 5 lb. of good beef.

Although no extensive **yearly milk records** of South Devons were published by the Society during the Great War, the following were then worthy of notice, viz., "Dorothy" (13181) gave 11,845 lb.; "Hilda 6th," 10,592½ lb.; "Merafield Miss Lavender" (10440), 11,265 lb.; and "Polly" (7747), 10,527 lb. The Milk Records published in vol. xxi. of the *Herd Book*, however, contain 137, of which 51 yielded over 7000 lb., 26 over 8000 lb., 15 over 9000 lb., and 5 over 10,000 lb., the highest reaching 13,643¾ lb. In addition to the qualities of beef and milk producing, the South Devons are noted for hardiness and early maturity. The Council of the Society are the **official buyers for export trade,** and particulars of these and of the most prominent breeders of pedigree stock can be obtained from the Secretary, W. Napier Smith, Solicitor, 6 Princess Square, Plymouth. The members in 1922 exceeded 700: the number of animals registered over 36,000. The Society holds a **sale at Totnes** in April and October each year, and at the Spring Sale in 1919 a young bull, fifteen months old, realised 310 guineas. The bull "Star of the West" (7367) has subsequently been sold to a home breeder for 500 guineas, and a cow for 400 guineas by John Luscombi.

Prominent breeders of South Devons are :—

B. Butland, Leigham, Plympton ; R. and W. Chaffe, Worswell, Revelstoke ; R. Ernest Cocks, Ranleigh, Plymouth ; R. R. Dawe, Ford Farm, Sydenham-Damerel, Tavistock ; G. H. Eustice, Gwinear, Hayle, Cornwall ; F. Furneaux, Berry-Pomeroy, Totnes ; S. S. Horton, Lixton, Loddiswell ; B. Luscombe, Bowden, Yealmpton ; J. Luscombe, Manor Farm, N. Hinsh, South Brent ; W. Paige, Treboul, St Germans ; J. M. Peeke, Hernaford, Harbertonford ; Sir Reginald Pole-Carew, K.C.B., Antony, Torpoint, Cornwall ; Robert Skinner, Stretchford, Buckfastleigh ; T. Willing & Son, Ipplepen, Newton Abbot ; J. Sparrow Wroth & Sons, Coombe, Aveton Gifford.

The Sussex breed ranks among the largest British cattle. It belongs to the old race believed to have given origin more or less directly to the West Highland, the Welsh breeds, the Hereford, and the Devon. To the last it bears a very striking resemblance, and no doubt it possesses this in virtue of a collateral descent from the "red cow" that at one time occupied the southern districts of England. Low says (1845): "The same race of cattle which exists in the mountains of North Devon yet survives in the Wealden." The influence of the soil and climate of the Weald country has considerably modified the form and character, which, it may be presumed, were at one time similar to those of the Devon breed. The skins . . . are covered with short hair, which has not usually the unctuous feel of the true Devons. The horns are longer and stronger. The colour is dark red—at times even "cherry-red," deeper than that of the Devons. Formerly both light and dark shades were met with ; the latter are in certain instances almost black, and a few quite black. The Sussex, though superior to the Devon in size and strength, lacks something of the neatness of the smaller animal. The cows generally have not been developed as milkers, but certain strains are excellent milkers, and in this respect the breed has improved in recent years.

The bullocks, which combined in a marked degree strength and activity, supplied just the class of animal suitable for working the heavy land of the Weald in Sussex and the adjoining counties. (See Plate XXXVIII. B.)

Aged oxen used to be sold at the local fairs, and, after grazing for a year were resold to the butchers, "weighing from one hundred and eighty to two hundred stones. . . . The famous ox from Burton Park, near Petworth, was 16½ hands in height, 8 ft. from the back of the horns to the tail; and from hip-bone to hip-bone across the back, 2 ft. 8 in.; the depth of shoulder, 4 ft. 7 in.; girth behind the shoulders, 10 ft., and weight, 35 cwts. 3 qrs. 18 lb."

It is not at all certain that it was an improvement altogether to discontinue the employment of oxen in favour of horses in working some of the heavier classes of soil. Such land under the plough suffers much more from the trampling of horses than from that of draught cattle, and in consequence there are some clayey districts where cattle may yet be seen at field work. The steers are great favourites with the graziers, butchers, and consumers. At three years well-fed specimens weigh twelve to fourteen score lb. per quarter. It has been accurately stated by Arthur Young, in his *Annals of Agriculture*, that "for beef-production, draught purposes, hardiness, early maturity, beautifully fine-grained flesh, and ability to thrive on poor fare, few breeds can equal the Sussex."

Edward Cane of Berwick Court was one of the most successful of the early improvers of the breed; he introduced it to the notice of the Smithfield Club, a circumstance which greatly influenced breeders to adopt much-needed methods for its advancement.

It was a Sussex steer that in 1867 was one of the chief competitors for the celebrated Smithfield Award carried off by M'Combie's "Black Prince." It was a complaint against the Royal Agricultural Society about 1875, fifteen years after the *Sussex Herd Book* had been established, that it was too slow to recognise and to encourage at its annual shows the developing importance of the breed. Owing to a great many good cattle having been left out of the Register, the *Herd Book* was, in 1902, most successfully reopened for animals of pure blood, subject to inspection, such being destined to take a position of increasing importance among our old-established British breeds. The breed's record as a beef-producer is excellent. At Smithfield Show in 1902 the first-prize steer under two years gave the highest average daily gain of any animal in the show, *i.e.*, 2 lb. 8·34 oz., with 68·02 per cent. of carcase to live-weight—a weight in excess of that of any other specimen of the same age present.

Owing to the colour and hardiness of the breed and its suitability for draught purposes, thirty head of Sussex cattle were sent, after the termination of the war in South Africa, to the Experimental Farm near Bloemfontein. The breed hung fire for a time, but recently has been doing extremely well in South Africa, and there is a greatly increased demand, about seventy having been exported within twelve months before 1919. It is on record that "Ten head of Sussex cattle formed part of a consignment shipped to one ranching region, and were on landing placed in quarantine with some forty-six head of other breeds. While the ten Sussex came out of the ordeal alive, nearly 50 per cent. of the other breeds in the station at the same time died."

Something of the close relative beef-producing merits of the two last described breeds and their relation to the Shorthorn may be gathered from this authenticated statement. "So long ago as 1894 a South Devon steer of J. S. Wroth, exhibited at the Smithfield Show, gave the following record: Age 668 days, live-weight 1833 lb., average daily gain 2·74 lb., beating the Shorthorn, whose highest daily gain was 2·37 lb., and the Sussex, whose highest daily gain was 2·36 lb."

Originally the breed was confined chiefly to Kent and Sussex, but herds are now to be found in Buckinghamshire, Essex, Northampton, and Warwickshire.

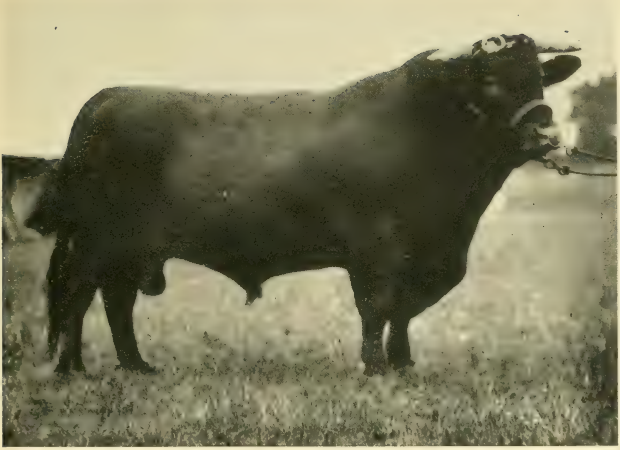
Encouragement to the development of the breed is liberally supplied by **widely distributed prizes** offered by the Sussex Cattle Herd Book Society. Prizes on the pre-war standard are awarded at The Royal, Royal Counties, and Bath and West of England shows. At Pretoria Show two champion cups are provided, one for a cow or heifer sired by a Sussex bull, and the other for the best Sussex bull bred in South Africa. Champion trophies are also given at Bloemfontein and Rand Shows, the former for the best imported Sussex bull and the latter for the best steer or heifer by a sire of that breed. Two medals are given at each of the South African Shows at Bloemfontein, Bulawayo, Durban, Maritzburg, Port Elizabeth, and Witwatersrand. In the Argentine, medals are given at Palermo and Rosario.

The **principal owners of Sussex cattle** are :—

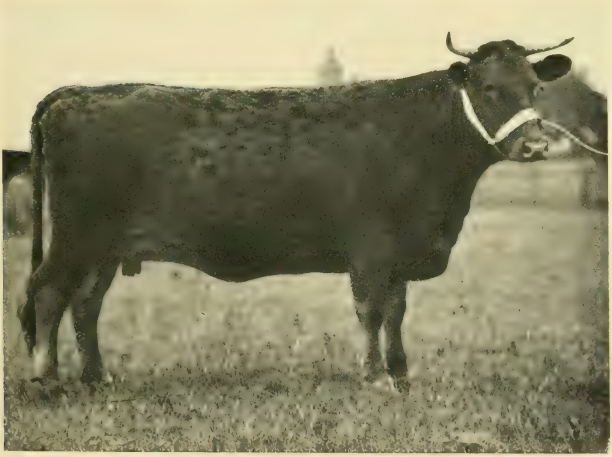
G. R. Bennett, Old House, West Hoathly, Sussex ; Ernest E. Braby, Drungewick Manor House, Rudgwick, Sussex ; J. E. Budd, Tidebrook Manor, Wadhurst, Sussex ; Major G. L. Courthope, M.P., Whiligh, Wadhurst, Sussex ; Walter T. Fremlin, Milgate Park, Maidstone. Kent ; O. E. d'Avigdor Goldsmid, Somerhill, Tonbridge, Kent ; H. S. Greaves, Cinder, Chailey, Sussex ; Rupert Gwynne, M.P., Folkington, Polegate, Sussex ; E. W. Hussey, Scotney Castle, Lamberhurst ; Lord Leconfield. Petworth House, Petworth, Sussex ; Campbell Newington, Oakover, Ticehurst, Sussex ; Rev. Francis S. Sclater, Newick Park, Lewes, Sussex.

Low aptly explains how representatives of the **cattle** belonging to the ancient **Celtic inhabitants** of these islands were preserved in certain parts. Wherever the region was difficult of access to the invaders, as in the case of mountainous tracts or large areas of forest, there the inhabitants naturally found shelter and safety for themselves and their cattle. Thus in hilly localities have been preserved the Scottish West Highland, the Welsh, and the Devon; and in the instance before us, the dense forests of the Weald afforded the necessary security for the ancestors of the Sussex breed. The cattle of the accessible parts of the interior of the country were either supplanted altogether, or much altered in form and character by imported blood.

Exactly the same condition of things exists in **India**, where the small, dark-haired, and inferior breeds have been driven away into remote and out-of-the-way corners; and the more valuable tracts of country, the highways of conquering armies, and more recently of trade and commerce, have been supplied by probably repeated importations of the larger and finer white-haired varieties. The parallel is not quite complete, as in some of the breeds in this country emerging from obscurity (and notable among these is the Sussex) are animals of great size and substance and wealth of constitution.

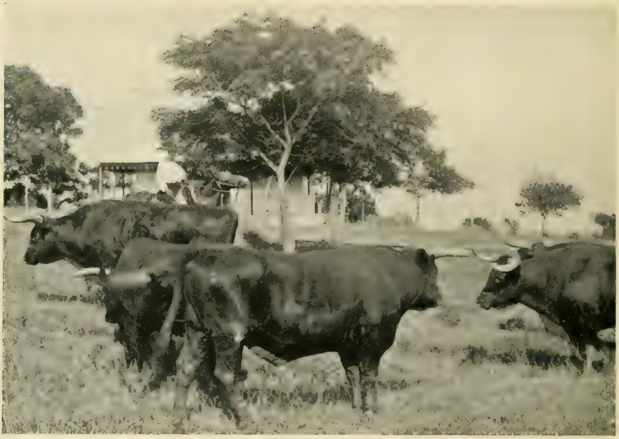


A. SOUTH DEVON BULL, "BOWDEN STRAWBERRY BOY."
First and Champion, Cambridge Royal, 1922. The property of Ben Luscombe.

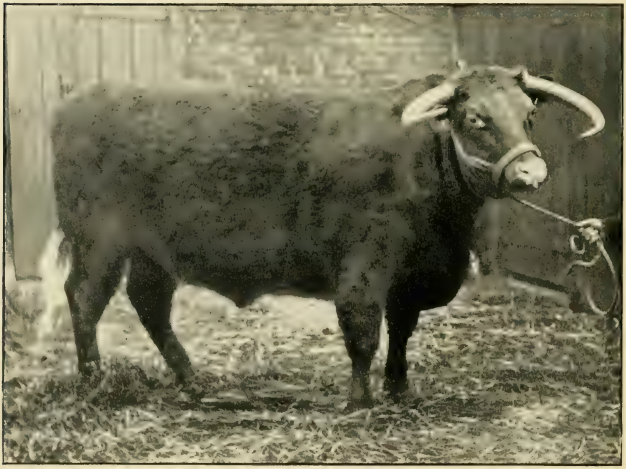


B. SOUTH DEVON COW, "WORSEWELL PROFIT." 6 years old.
First and Champion at Cambridge Royal, 1922.
Owned by R. W. Chaffe.

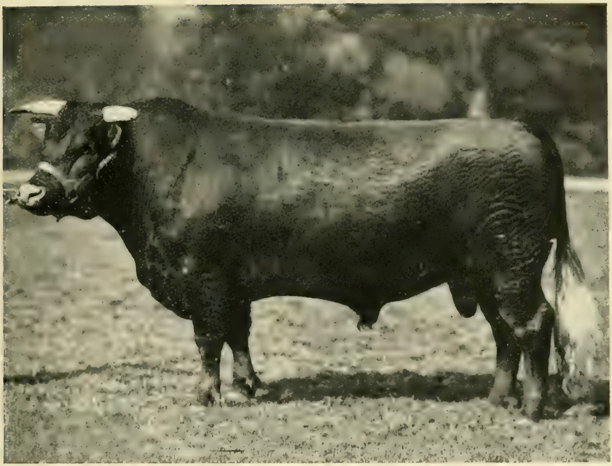
"*Agricultural Gazette Photograph.*"



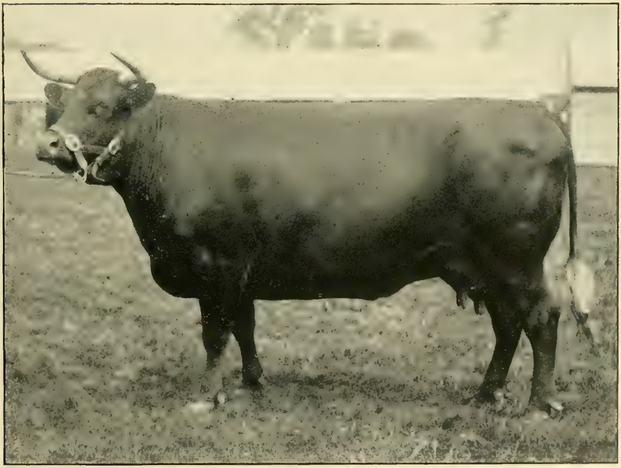
A. North Devon Steers.
Bred by Dr French, Cabaña Loraine, Paysandu, Uruguay.
[*Devon Cattle-Breeders' Society Herd Book.*



B. Sussex Ox, Grandsire "Gold Smith" (391).
Won the Breed Cup at Islington in 1886.
Bred by W. S. Forster, Gore Court, Maidstone.

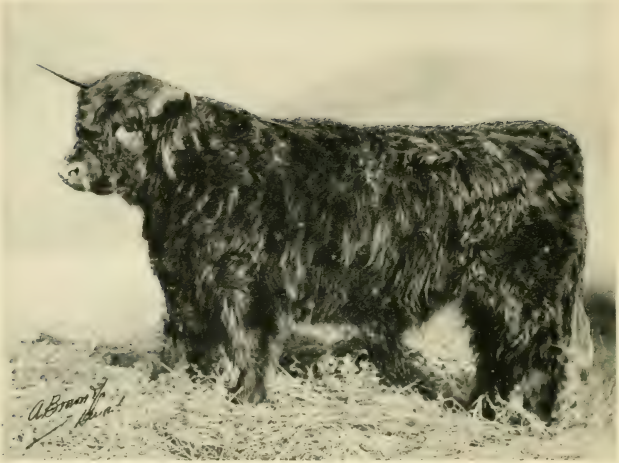


A. SUSSEX BULL, "SUNDRIDGE."
Owned by G. R. Bennett. Champion at Hayward's Heath Show and Sale, 1920.
First and Res. Champion at Cambridge Royal, 1922.

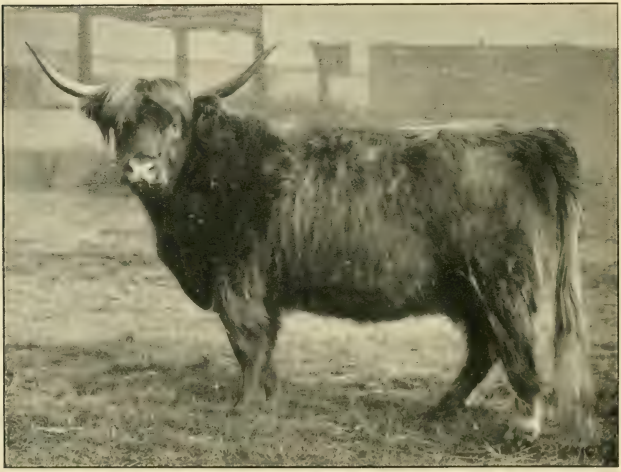


B. SUSSEX COW, "FANCY."
First, B. and W. and Royal Counties Shows, 1905, etc. etc. Owned by Earl of Derby.
[*G. H. Parsons, Alsager, Cheshire.*

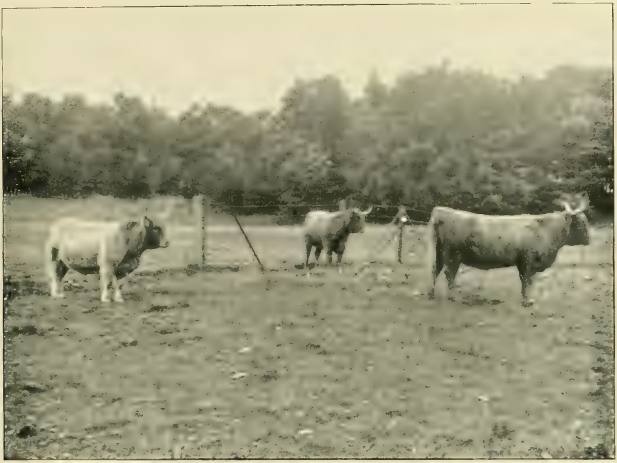
PLATE XL.



A. West Highland Bull, "Au-t-Urumach."
Bred by D. A. Stewart, Lochdhu. Sold at Oban, 1920, for 400 guineas.
[*A. Brown & Co., Lanark.*

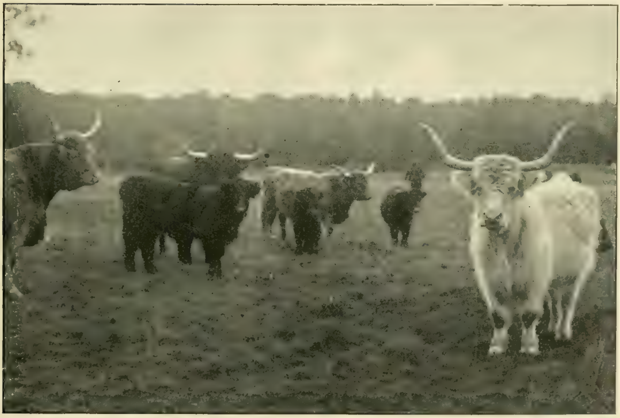


B. Highland Heifer, "Caroline II." Age 3 years.
President's Medal at the Stirling Highland Show, 1921.
Owner, the Earl of Southesk, Kinnaird Castle, Brechin.
[*Lent by Highland Society.*

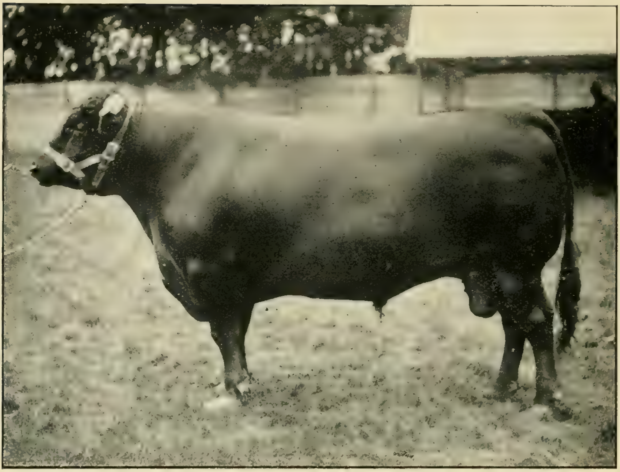


A. West Highland Four-Year-Old Heifers of the Blair Atholl Herd, two being descended from a swan-white cow with black points. The property of His Grace the Duke of Atholl.

[*Photo by the Author.*

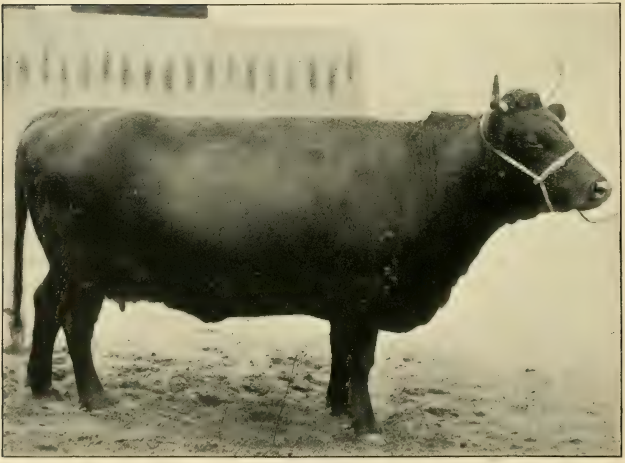


B. West Highland Cows and Calves. The property of the Earl of Southesk.



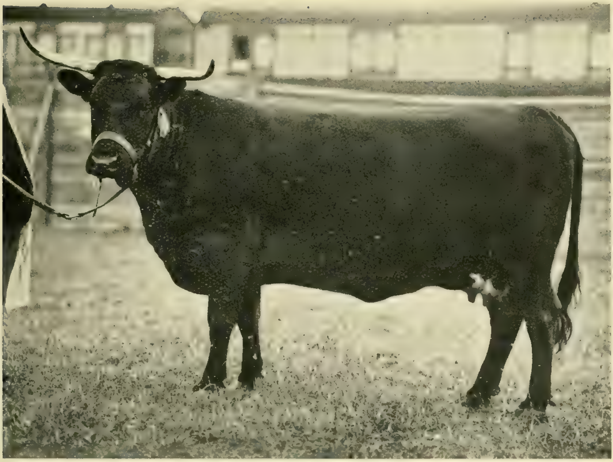
A. WELSH BLACK BULL (NORTH).

[*C. Reid, Wishaw.*

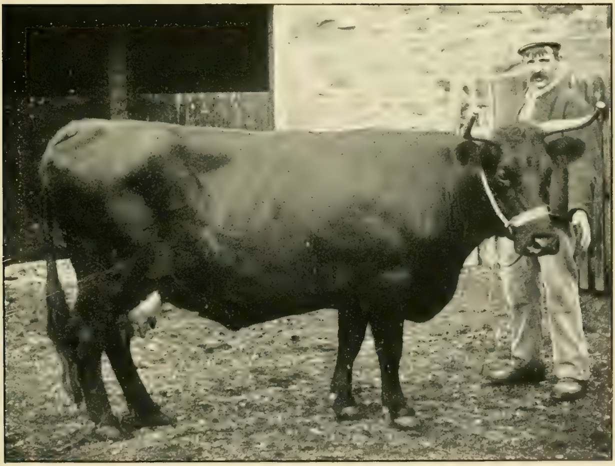


B. WELSH BLACK COW.

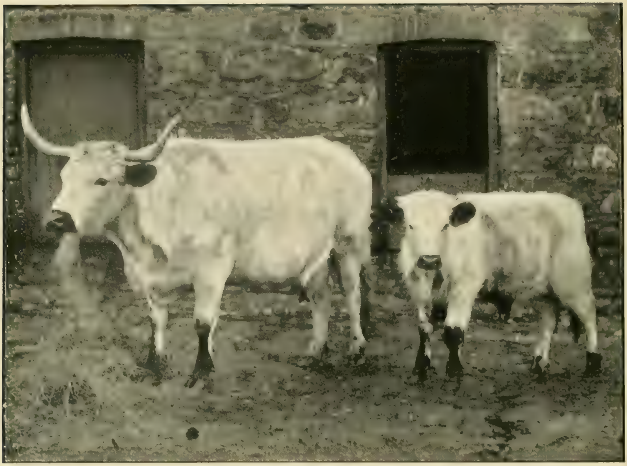
A Royal prize-winner. Bred by Colonel Platt, C.B., Llanfairfechan, North Wales.



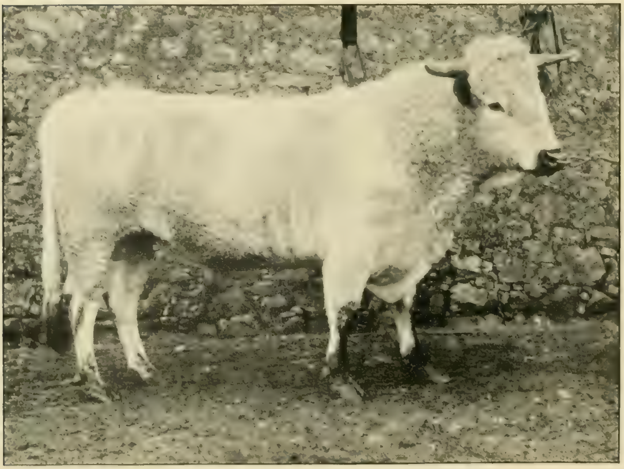
A. Welsh Heifer. 3 years old.
Owned by Lieut.-Col. David Davis, M.P.
[*"Agricultural Gazette Photograph.*



B. Welsh Black Cow (North), "Marian Lady."
[*G. H. Parsons, Alsager, Cheshire.*



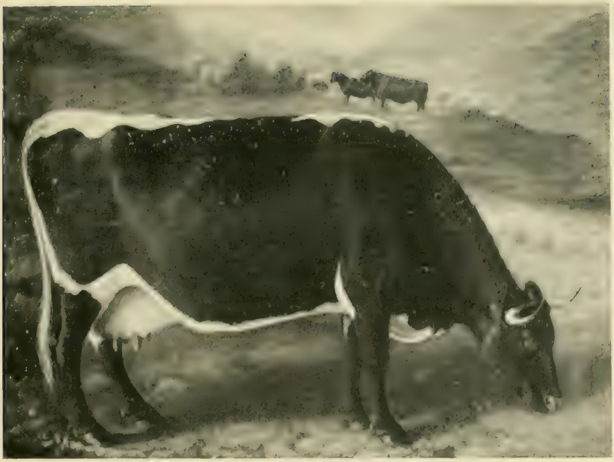
A. Welsh White Pembroke Cow and Calf.



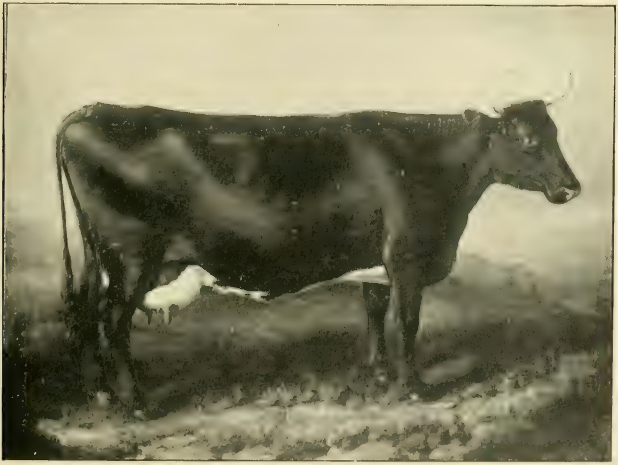
B. Welsh White Pembroke Bull.

Both owned and bred by the late Chas. Mathias of Lamphey Court, South Wales.

PLATE XLV.

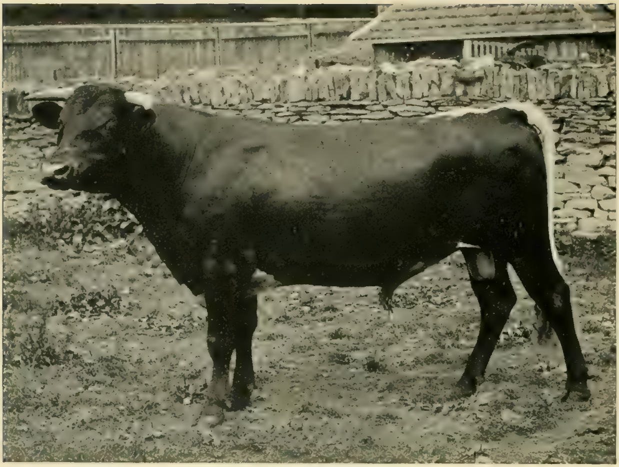


A. GLAMORGAN (EXTINCT WELSH) BREED.
Similar to the existing Old Gloucester.
From the David Low Collection, University, Edinburgh.

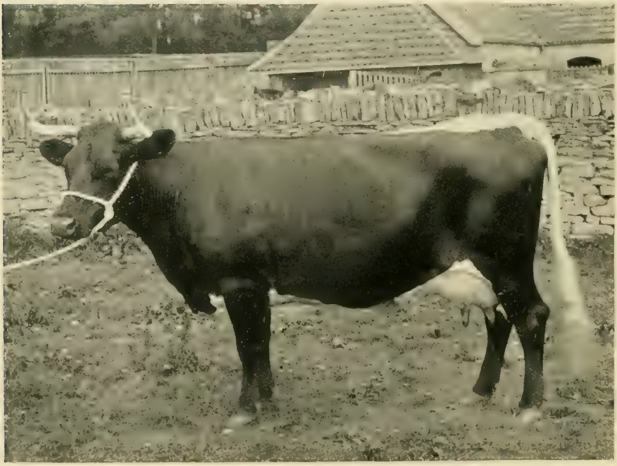


B. FIFESHIRE OR FALKLAND COW (EXTINCT), of a breed which "presented an analogy to the black dairying breed of Holland," and was used in the improvement of Aberdeenshire Cattle from which the Polled-Angus was in part developed.

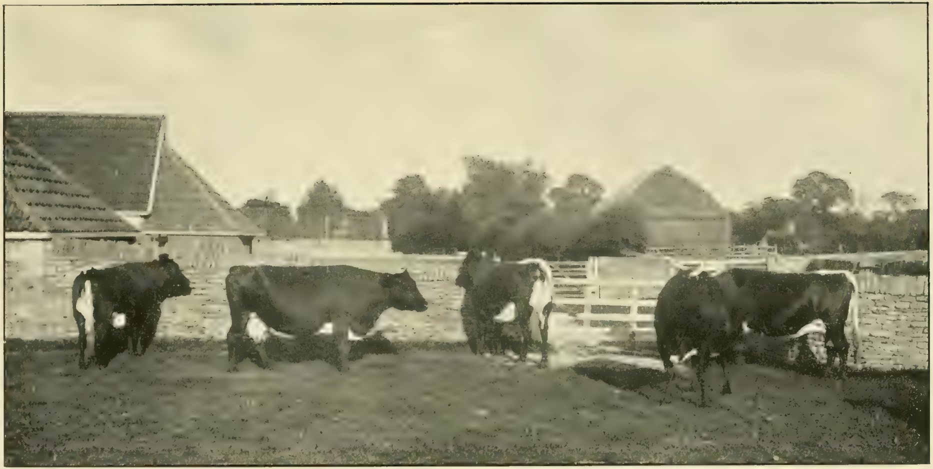
[*Both from the Low Collection of Paintings in Edinburgh University; Photos by T. J. Walls.*



A. Old Gloucester Bull.
In His Grace the Duke of Beaufort's Herd, Badminton S.O., Gloucestershire.



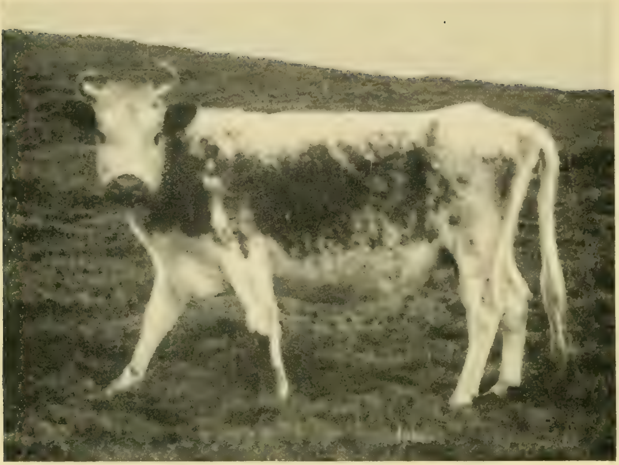
B. Old Gloucester Cow in Badminton Herd.
[Both by T. A. Trotman, Chippenham.



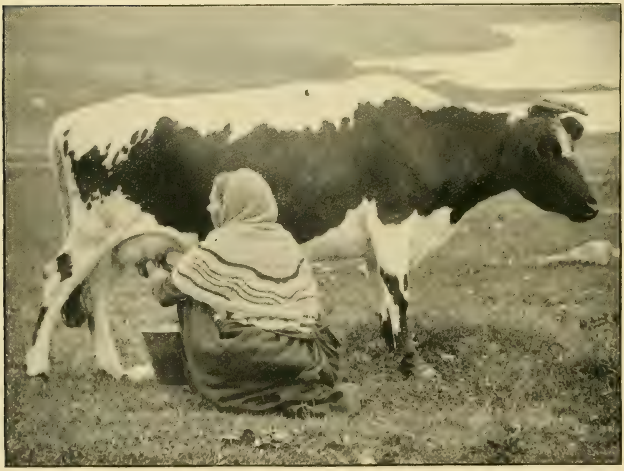
OLD GLOUCESTER DAIRY COWS.

In the herd of His Grace the Duke of Beaufort, Badminton S.O., Gloucestershire.

[*T. A. Trotman Chippenham.*



A. SHETLAND COW in winter coat. In poor condition in spring, but full and looking healthy.
[*Geo. Burns, Lerwick.*



B. SHETLAND COW GIVING MILK.

CHAPTER VII

CATTLE—THE WEST HIGHLAND, WELSH BLACK, GLAMORGAN, OLD GLOUCESTER, AND ORKNEY AND SHETLAND

The West Highland—History—Improvement or Development—Bullocks—Marts instead of Falkirk Trysts—Breed Points—Colour—The Atholl Herd—Crosses with other Breeds—**Black Welsh Cattle**—Breed Societies—Historical Authorities: Harvey, Marshall, Low, and Youatt—South Wales Type—North Wales Type—Welsh "Runts"—**White Belted**—**White Breed**—Lamphey Court White Herd—**The Glamorgan Breed** and its Extinction—**The Old Gloucester Breed**—Historical Authorities: Morgan, Evans, Youatt, and Marshall—Present Breeders—**Orkney and Shetland Cattle**—Origin—Youatt and Low.

THE **West Highland Breed** belongs to the Western Islands of Scotland (the Outer and Inner Hebrides) and to Argyllshire and the adjoining counties.

It is the remaining selected representative of the different varieties of Scottish mountain cattle, the domesticated descendants of the ancient breed of the forests.

The historical preface to Volume I. of the *Highland Herd Book*[1] (1885) says:—

> "Various classes of the breed have been made, but it is thought that there are really only two distinct classes (which have since been merged in one breed), namely, the West Highland and the Highlander, or Mainland Highlander."

The West Highland, or **Kyloe**,[2] was originally black, and smaller and shaggier than the Highlander, being kept in more exposed and altogether harder circumstances. The light colours now in fashion were introduced into Harris by Donald Stewart of Luskentyre from Perthshire, through picked specimens of the "Highlanders" common to the Northern Mainland and Argyllshire. **Improvement** in Skye was effected by Mackinnon of Corry, John Stewart, Duntulm, and afterwards of Ensay, and on the mainland by the Duke of Sutherland in the North, the Earl of Seafield in Inverness, Malcolm of Poltalloch in Argyllshire, and the Duke of Atholl in Perth. "One of the oldest and best-known breeds in Perthshire was that of Glenlyon, and from it all the principal folds in the country got their best blood." There was **no Bakewell** or Colling of the West Highland Breed, and the system of in-and-in breeding was eschewed for "natural breeding," by the selection of the best and Nature's selection, the survival of the fittest. **Youatt** says that at one time through the whole of the Hebrides "one-fifth of the cattle, on an average, used to perish every winter of starvation," and also that "it was the uniform experience that attempts at crossing only destroyed the symmetry of the Kiloes, and rendered them more delicate and less suitable to the climate and the pasture."

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[1] First suggested by the Earl of Dunmore in the Highland Society showyard at the Centenary Show in Edinburgh in 1884.

[2] Two explanations are given of this word. The more plausible derives it from the kiloes, or ferries, that separated the islands from the mainland, and the second from the Gaelic for "Highland."

At one time, before the stocking of the land with mountain sheep, which began in Argyllshire in 1760, "black cattle" occupied the wild pastures of the true Scottish Highlands. The mild or "open" character of the climate of the extreme west, along with the careful selection in breeding practised from time immemorial by the Macneils of Barra, the Macdonalds of Balranald on the Long Island, and others, tended to foster that superiority of quality which has enabled the improved strain successfully to supplant the inferior sorts inhabiting the inland uplands. Superior cattle were produced in "Islay, the southernmost of the range of the Inner Hebrides," the Isle of Skye, and Argyllshire. The West Highlander is the hardiest of all British breeds, and from an artistic point of view the most picturesque.

The bullocks, when three or four years old, are highly and justly appreciated as park cattle in all parts of the kingdom, where their long and elegant horns, variously coloured hair, and long, silky, shaggy, and uncommon-looking coats render them objects of universal interest and admiration. When gently handled, they are quiet and tractable, and even when "raised" by fear they will not charge unless cornered or cut off from escape. As beef-producers, they are slow in coming to maturity—about a year longer than most other British breeds—but the ultimate product is unsurpassed in quality in the leading meat markets of the kingdom. It has been remarked that their breed-defect is a tendency to flat ribs and a slight want of depth through the heart, but these defects are being quickly eliminated.

In the old droving days the principal market for Highland cattle was the Falkirk Trysts, held in August, September, and October. Since the introduction of auction marts, however, these trysts have been discontinued, and the principal market for the breed now is the West Highland Auction Mart at Oban, where a show and sale of bulls takes place annually in February under the auspices of the Highland Cattle Society, and sales of pedigree stock are held in May and October.

John Robertson, late agent to the Duke of Atholl, in John Coleman's *Cattle of Great Britain*, says:—

> "A well-bred animal, of almost any species, is a pleasant object; but there are perhaps few animals familiarly known to us so graceful in form, colour, and movement as a thoroughly well-bred Highland ox or heifer. In form it possesses all the characteristics so much and so justly prized in the Shorthorn—the straight back, the short legs, the broad chest, the breadth of loin and depth of rib, and, in short, the squareness and solidity of form which always imply weight, whether in man or beast; while the noble expanding horns, the fine, full, and fearless eye, the short, broad, well-bred muzzle, the shaggy coat of richest black, or red, or dun, or brindled colour, impart a picturesqueness which is still further enhanced by that grace and deliberation in movement so distinctive of all animals reared in perfect freedom."

Additional characteristic points are the "*forelock* between the eyes, wild, long, and bushy," and on the neck a hairy fringe or *mane*:—

> "In the bulls the *horns* should be sappy and substantial, and come level out of the head, slightly inclined forwards, and also slightly rising towards the points," a dropping between the crown and the commencement of the curve is "a very bad fault," and some prefer that there should be no rise. The horns of the cow usually "come squarer out from the head than in the male, rise sooner, and are somewhat longer, though they preserve their substance and a rich reddish appearance to the very tips"; at times the horns "come more level from the head, with a peculiar back-set curve, and very wide sweep which is more graceful in appearance. The *neck* should be clean and without dewlap; from behind the shoulder, the *back* fully developed and beautifully rounded, any slight sinking or hollow being most decidedly objectionable. . . . Viewed generally—the *quarters* are square between the hips and the tail, and from the tail right down to between the hind feet; the *legs* short and strong; the *bones* strong, broad, and straight; the *hoofs* well set-in and large, and the *legs* well feathered with hairs"; the *hair* in great profusion (especially in the unhoused islands cattle), long and wavy, a curl being faulty.

In addition to the *colours* already named, there are fawns (resembling certain shades of Guernsey cattle) and dun whites; and occasionally pure whites with black points like park cattle occur, which enhance the value of a whole drove of cattle in a market, owing to the amount of attention they attract from observers. The brandered or brindled cattle, Youatt defines as "showing a mixture of red and brown in stripes," which usually run perpendicularly.

The white relationship in West Highland cattle is further seen by the occurrence of a pure white hair through the coats of a very large number of them. Though not more frequent in the black and reddish-brown than in other colours, yet owing to the contrast it is more easily observed in them; but in all cases one requires to examine within two or three yards to find it. Parallel instances are to be seen in the white hair through the coats of a great many Galloways and Black Welsh cattle.

The Herd of the Duke of Atholl, numbering about 50, was established in 1863 by animals obtained from Breadalbane some time after the wild white cattle (also Highland, page 49) had been got rid of. In the herd there is a strain, which at intervals has produced eight swan-white animals. It originated in a white cow, with a little black round the eyes and muzzle, and a few black hairs in the ear, that the late Earl of Breadalbane received as a wedding present from the Duke of Argyll (*circa* 1849). No white bull has been kept, but when a white calf appears it comes usually of light-coloured parents. Some white cows produce coloured calves, and some white ones, by coloured bulls. The coloured cattle descended from the white cows have a greater proportion than others of white hairs in their coats, among the long as well as the short hairs. Two of the three animals shown in Plate XLI. A, a light dun and a light reddish-fawn, are examples. The fawn one, that in the centre, had hair in the lower part of the fringe of the ears 16 inches in length. The colours now in greatest favour are yellow brindles and reds. Some of the various shades of red have a very faint brindle through them, when looked at closely. Dark duns are not in favour, being often short and deficient in hair. The swan-white cows, with their black muzzles and black fringes, none of which were albinos, are distinct from the light creams, which are nearly white or at times smoky or dun-white, with the muzzle smoke- or dark flesh-coloured, the depth of tint corresponding to that of the hair, but with no black fringe. The cast of bullocks were annually sold (pre-war) to Blair Drummond at six quarters old for about £12 a-piece, or according to the markets, up to £16. The Second Prize Highlander at Smithfield and Edinburgh Fat Stock Shows in 1904, weighing over 17 cwts. at four years old, was a white bullock from Blair Drummond. Black, although not now in favour, has been thought to indicate hardiness, but some of the lighter-coloured animals with a tendency to an orange tint of skin feed better under forcing or artificial treatment.

The calves that are allowed to follow their mothers and are not handled or subjected to close contact with man develop wild instincts and practices, but it is usual to shut up those that are born before the grass comes, and let them suck three times daily, so as to tame them by handling while they are young and tractable. The cows do not excel as producers of large quantities of milk, yielding not more than one-third of that given by Ayrshires, although the quality of the milk and butter is excellent. When they are milked by hand the flow of milk does not continue late in the season.

The Highland breed had also an animal that "travelled," like the famous White Shorthorn Heifer (p. 63). D. D. Dixon's

History of Upper Coquetdale records that a **celebrated West Kyloe ox,** bred by Donald Campbell in Mull, and fed by Robert Spearman, Rothbey Park, Northumberland, was carried about in a large caravan, and exhibited at Kelso, Berwick, and other Border towns free of charge. When slaughtered, on 6th March 1835, the gross weight was 200 st. 6 lb. George Stephenson, of Newbiggen Farm, Ewesbey, Morpeth, possesses an oil painting of the ox, which indicates that the colour was roan.

West Highland cows cross admirably with bulls of most British breeds. Full advantage can thus be had of the good qualities of the breed without necessitating the sacrifice of the native hardiness of constitution, invaluable in a mountainous country, in the endeavour to induce early maturity. Unless the constitution is maintained, advantage cannot be taken in an upland country of the supply of natural food, which costs little and cannot be utilised except for such hardy animals. The outlay to produce a four-year-old Highland bullock reared on his natural food is very much less than that for a two-year-old stall-fed beast of the same weight, because the food of the latter is costly to grow and costly to buy. To substitute the early maturity animal—either by importation or by modifying the existing breed by in-and-in breeding—for the real West Highland ox in his home quarters would lead to a loss of profit to the farmer, and the loss to the community of the natural cattle-food of the district.

In the restriction of entries, the *Herd Book* Committee wisely reserve (in the Preface to Volume IX.) power to admit, for double the ordinary fee, meritorious animals that are known to be of pure blood, although their parents or grand-parents have not been entered. In this way a mistake made by several other Breed Societies, *i.e.*, that of closing the breed record too soon and shutting out really first-class animals, will be avoided.

An effort has been made to get a share of the **Argentine export** business in breeding-stock, as it is highly probable that the hardy Highlanders would withstand better than any other European cattle the piercing cold of the south-west winds of the Pampas.

Welsh Black cattle. — The registration of the one remaining important breed of Welsh cattle is now made under the **Welsh Black Cattle Society** (first volume 1905) which united the North and South Wales Herd Registers in 1904.[1]

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[1] (a) *The Welsh Black Cattle Herd Book*, contains the pedigrees of animals of the Castlemartin, Dewsland, and Anglesea breeds, with an introductory article by Richard Hart Harvey, of Slade Hall, 1874 ; and (b) *The South Wales Black Cattle Herd Book*, animals of the Castlemartin and Dewsland breeds, 1874.

Morgan Evans attempted in 1867 to form a Herd Book, but breeders were not fully alive to its value, and he did not receive the necessary support: the knowledge of the value of registration is now widespread. **Harvey** says:—

> "The Black Cattle are natives of the counties of Pembroke, Carmarthen, and Cardigan (not of Radnorshire or Breconshire), and are more generally known as Pembrokeshire Blacks, subdivided into Castlemartin and Dewsland breeds. They also extend along the North Wales coast up to Anglesea, and are then called the North Wales or Anglesea breed. . . . The breed of Black Cattle is allied to the Devons. . . . It may be described as a horned breed, generally of black colour, and frequently with white marks on the udders of the cows, also a few white hairs at the end of the tail. Sometimes a few white hairs are mixed up with the coat, but this is not always hereditary, and only comes out occasionally. A brown-black approaching chocolate is considered a good colour. Occasionally there are some cows striped red and black, also some quite white, with black ears, muzzles, and feet. . . . The horns should be of a rich yellow; they are generally tipped with black, and do not come out yellow to the very end like the Herefords. . . . A bull's horn should be low and well spread, the cow's narrower, and the pitch more upright. A really good animal of the black breed should approach very closely in shape to the modern fashionable breeds, and by careful and judicious crossing this has sometimes been attained. . . . The special characteristics of the blacks, which make them so valuable, are (1) hardihood of constitution, (2) aptitude for dairy purposes, (3) docility."

Although the cattle of North and of South Wales are acknowledged to form but one breed, and to be so closely allied to each other as to freely mingle blood without the results usual to cross-breeding supervening, still there are differences in the two types which will attract the attention of a close observer.

Marshall (1782), *Rural Economy of Gloucester*, page 212 says:—

> "Welsh cattle are extremely various: every province of the Principality seems to send out a separate breed. They are invariably of the Middle-horned species, but in regard to size they vary, in regular gradation, from the largest ox to the lowest Welsh runt."

Low (1845) records:—

> "The other races of the Welsh mountains have more or less of an affinity with the **Pembroke**, and exhibit the traces of a common origin; but they are most of them smaller in size, etc. . . . The yellowness of the skin appears as a deep orange, nearly black, on the inside of the ears, the mammæ, and other naked parts. This is deemed an important indication of the milking properties of the cow. . . . They have naturally a light hind-quarter, a character common to other mountain breeds. . . . A mixture of foreign blood takes from its hardiness and fitness for a country of mountains and scanty herbage.
>
> "The native cattle of the island of **Anglesea** are allied in their essential characters to the Pembroke breed, and manifest a common origin; but they are of larger size and coarser form, having acquired the characters suited to a lower country. They are distinguished by the upright position of the horns,

and the orange-yellow colour of the skin. This breed has been much mixed with Longhorns from Ireland; and various attempts have been made by individuals to improve the breed by crossing of different kinds. They have produced no beneficial effect upon the cattle of the country, the best of which are manifestly those which approach the nearest to the ancient type."

Youatt adds:—

"If they are longer in preparing for the market, they pay more at last; and, like the Scots, they thrive where an English beast would starve. . . . They are eventually brought to the market from 60 to 80 st., and sometimes even 100 st., and their meat will always bear a superior price to that of the larger cattle. In Anglesea and in the greater part of North Wales, the black cattle were formerly used extensively for the plough, and even on the road; they were docile and hardy. . . . The oxen have a peculiarly noble appearance" [due to castration being delayed until they were a year old], "and a haughtiness of countenance—a striking contrast with the mild intelligence of the Devon, and the quiet submission of the Hereford."

The **Welsh Triads** and even older sources of Welsh literature refer to **a variety of colours** in Welsh cattle, "speckled," "yellow," "brown," and "dun," but rarely of black and then with disparagement, as compared with white cattle with red ears, which were common and were evidently highly prized and mentioned also in the Welsh Laws. The great diversity of colour and type remained as above indicated by Marshall until the last quarter of the eighteenth century. Even to-day among unimproved Welsh cattle found in outlying districts where hardiness of constitution is an essential, the variation in colour is due more to heredity than to crossing with English and other breeds. Reds, duns, brindled and spotted cattle, and black with a light dorsal stripe, are more or less numerous.

The South Wales Black cattle in some respects resemble West Highlanders; the coat is long but wavy, or at times curly, not straight like the Highland hair. They have no great aptitude for fattening at an early age. When allowed to come to maturity they finish admirably, both as regards internal fat and external condition. They are superior **dairy cattle**, but capable of improvement by selecting and breeding from the male and female progeny of the best milkers. The instinctive practice of hiding their young they inherit from the white forest cattle. Calves, as a rule, are left with their mothers only for a few days, or in special cases a few weeks, when they are weaned and reared on skim milk, with supplementary food. The Pembroke strain is liable occasionally to throw a dorsal stripe, some white on the tail and under the body which, together with white or speckled faces, were characteristics of the earlier cattle, and indicated relationship to the extinct Glamorgan breed. While this section of the breed tends to be reduced in total numbers, pushed out by

Hereford and Shorthorn competition, the numbers of good cattle of the Northern strain are on the increase.

The North Wales Black cattle resemble in many respects the South Wales variety. But they have shorter legs, heavier heads, thicker necks, thicker, shorter, and whiter horns in the case of mature animals,[1] heavier and more silky coats of wavy hair (neither curly nor bristly), thinner skins, and a better touch. The recognised breed colour is black, though there is a frequent tendency to white markings on the underline. These and a few white hairs in the tail do not disqualify for the *Herd Book*. Red is not an uncommon colour, although not officially recognised. They are not naturally so wild as South Wales cattle, and more resemble the Shorthorn in disposition. It is asserted on good authority that, in certain strains, Shorthorn blood has been introduced to improve the form and develop a tendency to early maturity, but this kind of improvement is gained at the expense of loss of the natural ability to subsist on a scant food supply, and to withstand stress of weather. The most satisfactory way of improving all the hardy breeds which are periodically exposed to trying climatic conditions is to select, for breeding purposes, the best specimens within the breed. Sussex blood has also been successfully introduced in the development of the modern breed, but to what extent has not been made known to the public.

The cows are good milkers, and are believed to be now quite equal to the Pembrokes. They are being more sought after by English buyers. At the recent Menai Bridge sales quite a number of cows and heifers have been bought to go to Derbyshire, Yorkshire, and the North of England. A fancier of the breed from Wakefield stated at the 1920 Annual Meeting of the Welsh Black Cattle Society that a Welsh cow of his held the record for Yorkshire for butter-fat. Milk records are properly and systematically kept in the herds of Lord Penrhyn; that of the University College Farm, Bangor; and Major Platt's; and among the English herds, C. W. Crompton, Hall Green, Wakefield; Capt. T. S. Christie, Gilsland, Carlisle; Shirley H. Jenks, Pilsdon Manor (Dorset); Allan & Rogers, Craven Arms (Salop); Colonel the Honourable Guy Wilson, Richmond (Yorks); General C. R. P. Winser, Charlbury (Oxon.)

The formation of the Anglesey and Carnarvonshire Milk Recording Society will do much to extend the practice, which is of great importance in the development of this strain of the breed. Amongst other breeders are the following:—

Mrs Capper, St Weonards (Hereford); Miss Chapman, Ellesmere (Salop); Colonel Clowes, Leominster (Hereford); Colonel David Davies,

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[1] Young growing cattle start with black horns that gradually whiten from the base to near the tip.

M.P., Llandinam (Mont.); W. A. Jukes, Moreton-in-Marsh (Glos.); Owen & Livingstone, South Godstone (Surrey); H. J. Reckitts, Petersfield (Hants); Sir John C. E. Shelley Rolls, Bart., Winchester (Hants); Owen Williams, Cowbridge (Glam.).

Northern cattle as **beef-producers** are the better of the two, having broader backs and better flanks and thighs. There is a tendency to be high at the rump and tail-head, flat in the ribs, and slack at the loins, but these defects are being gradually eliminated. The bullocks have been long and highly appreciated as grazing cattle in the English Midlands, under the name of "Welsh Runts." They used to yield at four years old 50 to 60 st. of dressed beef, classed in the London market with prime Scotch. It is seldom they are kept now to reach this age, the majority being slaughtered under three years old, weighing on an average 14 to 16 cwts. live-weight, showing a daily gain of 1·5 to 1·6 lb. Some of the finest specimens of steers and heifers are exhibited annually at the Birmingham and London Fat Stock Shows, and are in demand. "Welsh Black bullocks usually figure in the carcase competitions in London. A Welsh bullock won fourth prize at the 1919 Smithfield Club Show and killed over 63½ per cent. of his live-weight: the carcase made the same price per stone—13s. 6d.—as the Galloway, which was placed second, and this price was 6d. per stone more than was paid for the third prize carcase, a Shorthorn—South Devon cross." It is an exception to see a Welsh carcase unsold on the first day of the London Show. Bullocks are sent in considerable numbers to graze in Kent, Leicester, Northampton, Warwick, and other English counties.

Sales.—Large numbers of good class Welsh steers and heifers are sold at Llanerchymedd, Menai Bridge, Llangefric, and Valley auction marts in Anglesey, throughout the year, by John Pritchard & Company, of Bangor, the Secretaries of the Society.

Black Welsh cattle are improving rapidly with the greater care devoted to their selection, breeding, and feeding. They have begun to be appreciated in America, and are undoubtedly gaining in favour. Shirley H. Jenks, of Pilsdon Manor, West Dorset, has recently exported four bulls to South America. It is to be hoped that eventually the two- and three-year-old Welsh bulls, sold by auction at Menai Bridge, at the Society's Spring Sale, on the first Tuesday in April, at very reasonable prices, will find their way to the Argentine, to cross with draft Hereford cows for one crop of calves. From a grazing point of view this would be a good commercial cross, having early maturity on the Hereford or dam's side, and the extra percentage of lean meat and stronger bone on the sire or Welsh side. American ranchers have been taught a severe lesson by the death of immense numbers of their cattle, and have been shown the absurdity of breeding on the exposed prairies of the Far West stock that is too fine and too soft. Had they been fortunate enough to select Herefords (which they did in the end), Welsh, Galloway, or Highland cattle, they might have saved themselves the serious consequences of early disaster. Welsh cattle have proved their worth as dual-purpose animals in South Africa. Perhaps the best cross calves, out of Matabeleland native cows, seen by the Author in Rhodesia in 1908, were by a Black Welsh bull.

White Belted or sheeted **Welsh cattle**, with the common black or equally characteristic red coat of the cattle of the Principality, appear in certain districts of North Wales. Little is known of their origin, but it is believed that about the beginning of the nineteenth century Sir Robert Vaughan of Nannau, Merionethshire, imported some cattle, probably Holsteins, with a view to the improvement of the native stock. There is also a tradition that about the seventies of last century two belted cows were brought over to Anglesey from France. During the last decade of the century, Wm. Lester Smith, acting for Lord Penrhyn, collected a number of the best black and white specimens of the variety, and formed the herd which at the Home Farm, Penrhyn Castle, Bangor, numbered in 1906 upwards of 100 head. At first "a few of the calves came wholly black, a few without a complete belt, and a few with the white extending over almost the whole body," but only those properly marked were kept for breeding. The cattle were dispersed in 1907, and the variety no longer exists as a herd in North Wales. Pedigree Welsh Black cattle have taken their places at Penrhyn Castle. The sheeted herd showed the typical Welsh characteristics of the Northern or original Anglesey variety, but of the larger, rougher, and more lanky sorts. They were poor milkers, and at an early age poor feeders, but in time they grew to enormous weights. The white markings excluded them from the *Herd Book*. The bulls were usually savage.

A white-belted herd, believed to be Dutch, existed for many years at Broadlands, Hants, but when the importation of Dutch cattle was stopped, it was crossed by Devon bulls and transformed into a red herd with white belts. This cross, while increasing the tendency to beef-production, reduced the milking qualities of the cows. By the use of a black and white sheeted bull from Lord Penrhyn, the original white belt with black is now being restored.

The ancient white breed of the Principality has been rehabilitated by selecting and mating together those specimens of the South Wales breed which have "thrown back" in the matter of colour to their forest ancestors. In every other respect they are distinctly Pembroke cattle. Their colour is chiefly white, but there are frequently black spots over the body. The muzzles, ears, and eyelashes are black, and the feet and fetlocks should also be black. The late Charles Mathias, of Lamphey Court, to whom the Welsh originals of Plates VIII. and XLIV. belonged, raised this off-shoot of the South Wales breed to a position of importance.

The difficulty of procuring at all times stud bulls good enough to keep up the standard of a small number of cattle is got over by the use of a choice black bull when a white is not available. A large proportion of his progeny take after the mothers in being white with black points, and those that are born black are transferred to the black cattle herd.

R. H. Harvey wrote (1874): "The late Lord Dynevor had some very fine specimens of the white breed near Llandeilo, and I have often admired the five-year-old oxen as I have passed the park." This herd still exists.

For **Professor David Low's** beautifully illustrated book on *The Domesticated Animals of the British Isles*, published in 1842, was selected a Pembrokeshire "cow eight years old," from Haverfordwest, to represent the type of the Wild Forest breed. The "picture" of the animal is among the collection of other original oil paintings from which his illustrations were taken —now exhibited in the Department of Agriculture and Rural Economy in Edinburgh University.

The Glamorgan breed is interesting historically as the connecting-link between the Black Welsh cattle and the Red Devons and Herefords, although as a breed—one of the oldest and one of the best for the production of milch cows and draught oxen—it is now extinct. According to **Youatt**:—

> "They were of a dark brown (the bull almost black) with white bellies, and a streak of white along the back from the shoulder to the tail. They had clean heads, tapering from the neck and shoulders; long, white horns, turning upwards; with a lively countenance. Their dewlaps were small, the hair short, and the coat silky. If there was any fault, it was that the rump, or setting on of the tail, was too high above the level of the back to accord with modern notions of true symmetry," a common original defect in Welsh and in some other British breeds.

A Welsh writer, about one hundred years earlier, "describes the cows as being of a large size, some red and some pied." There were two strains, as in the Devon breed. **Low** says:—

> "The Glamorgans of the lower country fall short of the ordinary size of the Durhams and Herefords; but yet they are of the larger class of

cattle. Their horns are small, fine, and pointing somewhat upwards; and in the breed of the hills, the horns have yet more of the upright curvature. The skin is generally orange-yellow, and the individuals are more esteemed in which this colour prevails. The hair is dark brown, usually broken with white. . . . The cows are exceedingly good milchers, giving a rich yellow cream. (The average yield of milk is about 16 quarts a day.) The domestic dairy has always been an important object of attention in this and other parts of Wales. The Glamorgan cattle also produced a rare quality of meat, highly prized in the metropolitan and provincial markets."

Youatt accounts for the first decline in the quality of the breed, which ultimately led to its extinction, by pressure of the more favoured and more improved Shorthorn, Hereford, and Devon breeds. He says:—

"During the French revolutionary war the excessive price of corn attracted the attention of the Glamorganshire farmers to the increased cultivation of it, and a great proportion of the best pastures were turned over by the plough. Turnip-husbandry necessarily followed; and then the improvement of their sheep stock became an object of importance, and the cattle were almost entirely neglected."

The accompanying **illustration** (Pl. XLV. A) of a Glamorgan cow is from a photograph of one of the Low collection of oil paintings referred to on page 139.

The old Gloucester breed at Badminton has been preserved from extinction by the Duke of Beaufort. **Morgan Evans,** in *Coleman's Cattle of Great Britain*, expresses the belief that they were descended from the Welsh breed, which at one time extended into Monmouth and Gloucester. He goes on to say:—

"The true Gloucester cow shows a good deal of character, being a lengthy, good-looking animal, with light fore- but deep hind-quarters, and good milking points. The body is brown; head, nose, and legs black; horns well shaped and white, with black tips; tail and top of rump white; udder white with black teats; and tongue on upper side and end also black. The great peculiarity is the white mark, which extends from the loin along the ridge of the tail, and down between the hind-legs to the fore-part of the udder."

In 1834 **Youatt** refers to the breed as, "nearly extinct, and evidently of Welsh origin, mingled with the Hereford, and sometimes with the cattle further inland. They were the Glamorgans chiefly, but upon a larger scale, and of a different colour. The Glamorgans are black, or inclined to brown; the Old Gloucesters were either red or brown. The bones were small and the carcase light, scarcely averaging more than twelve score per quarter. The bag was thin, yet large, and the milk abundant and long-continued. The characteristic mark was said to be a streak of white, generally along the back and always at the root of the tail."

Marshall at an earlier date (1789) writes of "the characteristic colour black-red, provincially called brown; with the face and neck inclined to black; the head mostly small; neck long; shoulders fine and generally clean; the carcase mostly long; the hide thin and the hair short; the horns of some winding, with a double bend in the middle-horned manner. . . .

For dairy cows I have not, in my own judgment, seen a better form; and it was this breed which raised the Gloucestershire dairy to its greatest height."[1]

Reference is made to the superior qualities of the Badminton herd. In 1783, Marshall asserts, the vale dairy cows were mostly of the Gloucester breed, and had been so from time immemorial; but they were rapidly supplanted or crossed by the Staffordshire Longhorns, or "North-Country sort," which were reputed to be hardier in the open strawyards in winter, and to fatten more easily. In the **remnant of the breed** there is no trace of the defects which were liable to appear through neglect in breeding, *i.e.*, they are no more "narrow in the chest, light in the hind-quarters, and long upon the legs." The milk is very rich in cream in small globules, and specially suited for cheese-making.

The practice of fortifying small herds by crossing with Shorthorns has been stopped by the **Gloucestershire Cattle Society**, inaugurated in 1917, and "largely due to the initiative of Stanley Williams of New Park, Falfield." The officers for 1922 are as follows: *President*, His Grace the Duke of Beaufort, Badminton, Glos.; *Council*—Lt.-Col. H. C. Elwes, D.S.O., M.V.O., Colesborne, Cheltenham, *Chairman;* The Lady Susan Hicks-Beach, Coln St Aldwyns; M. H. Gazzard, Sanigar, Sharpness, Glos.; T. Webb, Hardwicke Farm, Glos.; S. Williams, New Park, Falfield, Glos.; A. Jones, Bowcott Farm, Wotton-under-Edge, Glos.; Capt. J. Poore, Estate Office, Badminton, Glos. *Hon. Secretary and Treasurer*, G. E. Lloyd-Baker, Hardwicke Court, Glos.; *Assistant Secretary* (to whom all correspondence should be addressed), C. N. Smith, *Gloucestershire Chronicle*, Gloucester.

The membership of the Society numbered 38 in 1922, the registered herds were 24 with a total of 215 animals, 29 bulls and 143 cows that had passed an inspection sub-committee, and 25 more provisionally entered.

The following members who do not appear in the list of officers, have their herds entered in the *Herd Book:* Mrs Bades, Chippenham; Browning Brothers, Nash End Farm, Stonehouse; A. Browning, Heathfield, Berkeley; Sir Gerald Codrington, Bart., The Old Hundred, Tormorton, Badminton; Mrs Featherstonhaugh, Ladyswood, Malmesbury; Miss Flower Grimes, Purleigh-by-Mundon, Essex; A. Halsey, Wickwar; J. King, Berkeley; S. J. Mower, Huntingford, Charfield; F. W. Randall, Michaelswood Farm, Wick, Dursley; K. Smith, Wick, Dursley; D. Stinchcombe, Upper Wick Farm, Dursley; A.

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[1] With this view **Youatt disagrees**, declaring that "almost every variety of breed is found there, and the milk of all is mingled together."

Wilcox, Rectory Farm, Arlingham; R. Williams, Road Farm, Hardwicke; J. L. Withers, Lower Farm, Shelsley, Beauchamp, Worcs.; M. Woodman, South Maiston, near Swindon.

The **old Orkney breed**, which was a variant of the Zetland, "but even smaller and more ill-shapen," is now extinct, having been gradually bred out by the use of Shorthorn and other bulls brought over from the Scottish mainland.

Shetland cattle are disappearing in the same way, and only in a few districts can the true type with some difficulty be found. **Youatt** says:—

> "Shetland cattle exhibit evident traces of the same origin with the West Highlanders. They have been diminished in size by the coldness of the climate and the scarcity of food. . . . They are small, gaunt, ill-shaped, so far, indeed, as their shape can be ascertained through the long thick hair with which they are covered, and which forms an impenetrable defence against the snow and the sleet. They are rarely more than 4 ft. high at the withers, and sometimes scarcely more than 35 or 40 lb. a quarter. . . . On the richer pastures of the North of Scotland they thrive with almost incredible rapidity, and their flesh and fat, being so newly and quickly laid on, is said to be peculiarly delicious and tender. They run to 15 or 16, or even 20 st. in weight."

Low held a different opinion, which is preferable in view of the historical connection of the islands with Norway, and the fact that the people, and, till recently, their language, were Norse. He wrote:—

> "The cattle are distinctly Norwegian in their character, and a similar race extends to Iceland. They are small, but of very good form when pure, and fatten with great quickness when carried to superior pastures. Their horns are short (irregular in form and insignificant), their skin is soft, and their flesh is equal to that of any cattle produced in the British Isles. They are of various colours, generally parti-coloured, and tending more to the lighter shades than the cattle of the Highlands. The females receive the male at an earlier age than is known in the case of any other breed in this country (at five or six months, or even at four months). The cows are tolerably good milkers, in which respect (although smaller) they agree with the cattle of Norway, and differ from those of the Highlands; and in this respect, too, they agree with the cattle of Jersey and the islands of the Channel, which are likewise believed to be of Norwegian origin."

A striking instance of atavism[1] in this breed was reported to the Author by Professor Blackburn in 1893:—

> "About thirty years ago Mrs Blackburn got at Roshven, Moidart, N.B., a pure Brittany bull and cow, but after some years there was a difficulty in securing a pure Brittany bull to keep up the stock, and a young bull—

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[1] **Atavism** (from *atavus*, an ancestor), or "throwing back," or "reversion," is the appearance in an animal of some character which the immediate parents had not, but which existed in its ancestors.

a cross between a Brittany and a Shetland—was bought. A very considerable proportion of the progeny of this bull by the pure Brittany cows were pure white, with black ears and points like the wild white cattle—not albinos."

As white with black points is a combination of colour unknown in either of the pure breeds from which the cattle sprang, its repeated appearances can best be explained as instances of reversion to an early ancestor, most probably the ancient white cattle from which the wild park cattle are believed to have descended.

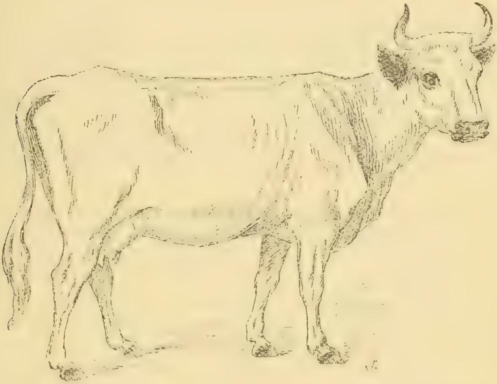

FIG. 8.—SECOND CROSS COW, showing reversion to the markings of the ancient wild cattle.

Drawn by the late Mrs Blackburn.

Low shows how the introduction of foreign blood was carried out :—

"The cattle of Zetland have necessarily been much mixed with those of Orkney, and the latter again with those of Caithness and the Northern Highlands. These mixed races are rarely equal to those of pure descent." He had in consideration the fact that "the cattle of the Zetland Islands are left almost in a state of nature, without sufficient sustenance in winter, and with scarce any other shelter than the desolate rocks of the country supply."

He advocated greater care in management, and "the introduction of suitable males for breeding" from the parent stock in Norway. He also said, prophetically, the "first crosses with superior breeds, as the Shorthorn, are admirable," but "this system of crossing, though it may be more profitable to individual breeders, can do nothing for the general improvement of the stock of the country itself."

CHAPTER VIII

CATTLE—ENGLISH WHITE AND RED POLLS[1]

Somerford Park White Herd—Characteristics—The "Missing Link"—**Blickling Hall** and **Woodbastwick** Herds — **Northrepps** Herd and **Stanton** Herd—Other extinct Herds—Origin and History—Points and Modern Features—The Swedish **Fjäll Polled Race**—Summary by Dr E. A. Arenander on Immutability of Polled Breeds—**Red Polls**—Authorities quoted: Marshall, Young, Euren, on Points and History—Early Breeders—Dual-Purpose Cattle — *Herd Book* and Red Poll Society—Crosses—Prominent Breeders—**Suffolk Golden-Dun**—**Polled Cattle** Extinct.

THE **Somerford Park White Polled Herd** of Colonel Sir Walter Shakerley, Bart., near Congleton, Cheshire, numbered about 35 in 1893. When the writer saw it in 1904 it had been reduced to 26, *i.e.*, 14 cows in milk, 1 three-year-old heifer that had slipped calf, 4 two-year-olds in calf, 1 yearling heifer, 1 yearling steer, 4 calves (one a bull), and 1 bull five years old. It claims to be the most direct representation of the domesticated, hornless descendants of the ancient forest cattle of the country. Four generations of owners have not known the origin or history of the breed. Tradition, a generation ago, said that it had been in its present quarters for over 200 years. Probably the original cattle were enclosed in a part of Maxwell Forest, which at one time extended over the Congleton neighbourhood. In general appearance (including colour) this breed strongly resembles the Chartley, the great difference being the want of horns. In some minor details the resemblance is striking—for example, both breeds have a top-knot of long, white hair, white udder, usually black teats, and black spots, most numerous about the neck and head. In addition to the black spots referred to bearing black hair, there are many black patches, large and small, on the skin of the body, with white hair, which are completely obscured during winter, but show through the thin summer coat. The skin of the head is black under the hair, both the characteristic black ring round the eye and the white or mottled hair covering other parts of it.

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[1] Excellent accounts of the different breeds of Polled Cattle, by acknowledged authorities, appear in the 13th *Report of the Kansas State Board of Agriculture*, Part III., 1902, to which indebtedness is acknowledged.

Some cows had the patches of black skin expanding until they covered the back like a sheet of black cloth, producing white hair similar to that on some of the smaller spots on others. In 1904, one cow in full coat showed only a few black spots on the body, but was black-skinned all over, except a speckled udder. The eyes of the Somerford Park cattle are very black, large, and prominent. The forehead is remarkable for width, and the crown is high and massive. The upper edge of the ear has often a finger of long white hair like that of a Skye terrier hanging down over the black background of the lobe. Very few have red ears, although for some years after the rinderpest (1864), a bull with red ears and muzzle was used. In some good specimens the ears are set very low. The cows are normally fertile, but there is a tendency to produce an abnormal proportion of female calves. Two possible indications of the effects of consanguineous breeding were noticeable in a tendency in one cow to protrusion of the vagina, and, in a few cases, in a loose attachment of the shoulder-blade, or scapula, to the trunk.

The milking powers of certain members of the breed are exceptionally good. In 1893 their daily average, when in full flow at pasture, was 3 gallons each. But individual cows appear now and then which give, when "in bloom," as much as 14 quarts at a milking, or 7 gallons in the day. When dry the cows are not deficient as beef-producers. A moderately fat six-year-old cow killed by a local butcher in the winter of 1904-5, weighed, fore-quarters 7 score 11 lb.,[1] and hind-quarters 6 score 10 lb.,[2] equal to 28 score[3] for the whole body. The quality and flavour of the beef were excellent, but the fat was very yellow in colour, resembling that of Guernsey beef. The herd was one year crossed with a Shorthorn bull from Derbyshire after being reduced by the rinderpest. Shorthorn qualities were thus introduced. For some years afterwards a good many cows were kept which were black-and-white or mottled, but in 1904 nearly all had returned to the breed-marking, viz., white with black points, ears, and muzzle, with a little black ring round each eye. The sire of the herd bull came from Woodbastwick in Norfolk, and he developed loose horns at two years old. A good many of the cows by the Shorthorn bull grew loose horns, and again they have appeared since the arrival of the Woodbastwick bull. An old bull in his fifth year (1904) developed a small horn. The breed is now (1919) well fleshed and massive and numbers 29 cows and 2 bulls. The whole appearance of the animals is striking and attractive, the head and neck being specially handsome. The rudimentary mane present in the bull when in full coat is not only an ornament, but also an additional indication of the connection of the breed with the ancient "wild beasts" of the forest. This is one of the most interesting breeds of British cattle, as it forms (with the related polled whites referred to later) the "missing link" between the wild cattle and the breeds under domestication, and supplies a connection between the horned and polled varieties. It also tends to prove the existence of a superior power of milk production in the aboriginal race of our island, or at all events in the domesticated branch of it.

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[1] *i.e.*, 151 lb. A score, =20 lb., is a local weight by which fat cattle and pigs are sold.

[2] 130 lb.

[3] 560 lb.

The cattle of **Blickling Hall** and **Woodbastwick**, in Norfolk, had a common origin in the White Polled cattle of Whalley Abbey, Lancashire, probably saved from destruction by the abbots of Whalley in the "Lords' Park." Tradition says that this herd, which ceased to exist at Whalley in 1697, was transferred to Middleton Park, also in Lancashire, and to Gisburne Park in Yorkshire. To Gisburne they are said to have been "drawn by the power of music." There some specimens were "perfectly white, except the insides of the ears," which were brown. The Middleton cattle were also white, but "some had black, others brown ears." They were transferred to Gunton Park, 16 miles north of Norwich, the Norfolk seat of the first Lord Suffield (created 1786), after the death of his father-in-law in 1765. The herd died out there not later than 1853; but some animals had, about half a century before (between 1793-1810), been removed to Blickling Hall, to establish the existing breed, probably by the second Lord Suffield, who married the heiress of Blickling (near Aylsham). Other members of it had been sold to Albemarle Cator of Woodbastwick Hall, near Norwich.

Storer, quoting reliable authority on the **Gunton Herd**, says:—

> "The colour of this breed was white, with black ears, but some had dark brown ears; nose black, no horns, very good skin; hoofs also black. They were very large, big-framed beasts, with wide haunches, back, and loins, and of considerable height at the spine-line. They were not large consumers for their size, and were generally very healthy. The cows were capital milkers, and had very large, well-formed udders. The calves always came pure-white (swan-white) except the noses and ears, but in a few instances inclined to cream-colour. I never recollect seeing any of the true breed spotted with black or red. The herd consisted of about forty animals, two or three of which were bulls. They were never crossed with any other cattle."

The Blickling Herd was reduced by rinderpest to some three or four calves. Constance, Marchioness of Lothian, contending against decreased fertility, made a strenuous, though not quite successful, effort to breed it up to its former standard. At the

Norfolk Agricultural Association Show at Blickling in 1887, "Blickling Tom," an exceptionally fine specimen of the breed, gained the premier place. After the death of the Marchioness the herd was reduced to 10. It now (1919) consists of 11 cows and 2 bulls, and belongs to the tenant of the Park, T. H. Case, also a breeder of British Friesians.

The Woodbastwick Herd was of more recent formation, dating from about 1840, when one or two White Polled cattle were bought from the fourth Lord Suffield by Albemarle Cator. One cow "had black spots round her muzzle; the ears and the circles round the eyes were dark brown. She was in calf when she came, and produced a bull, which was retained; the dam remained barren for more than a year, and her second calf at Woodbastwick, a heifer, was by her first."

Although at Blickling black ears prevailed, and at Woodbastwick red ears were preferred, the two colours were common to both breeds, which mutually gained in constitution as well as in colour by exchange of calves of both sexes. For about twenty years the Woodbastwick cattle were bred pure; but about 1862 a well-bred Shorthorn bull was used for at least two seasons, and about ten years later another white pedigree Shorthorn bull was introduced. Early in the eighties of last century a black-and-white bull of the Somerford Park breed was secured, and with this change of blood came the rough poll, a greater breadth of forehead, low set ears, black spots on the skin of the neck and shoulders and legs, sometimes black teats, and in a few instances considerable sheets of black skin over the back, growing white hair. Fresh, nearly related, blood has been imported by exchange from time to time from the Blickling herd, as in 1888; and a satisfactory bull was got on loan for a few months from R. E. Lofft in 1889; but, owing to the increasing difficulty of securing a satisfactory change of blood, a white Shorthorn was again used towards the end of the century, with satisfactory results as regards size and constitution, but to the detriment of the colour-markings, which lost uniformity of type. At the time of the writer's visit in the spring of 1905, the herd consisted of 14 cows, 6 heifers, and 3 bulls—massive, well-built animals of the dual-purpose type. Only two cows remained which had not more or less of the recent importation of Shorthorn blood. Four cows had red points, and all of that colour had correlated white teats. A number had little colour-marking, which decreased in area under the Shorthorn influence. The cows breed regularly and are excellent milkers, in spite of the nature of their pasture, which is light and of second quality. They numbered in 1919 4 bulls and 26 cows. The milk records of five of them were chronicled by Sir Claud Alexander, Bart., in the *Live Stock*

Journal Almanac for 1919, as follows: "Woodbastwick Blue Bell II.," 11,952 lb.; "Woodbastwick Blanche II.," 11,033 lb.; "Woodbastwick Jessie IV.," 10,923 lb.; "Woodbastwick Primula I.," 10,716 lb.; "Woodbastwick Poverty IV.," 10,604 lb. Farmers bring cows to the white bull, and a good many white polled half-bred cattle, greatly appreciated by butchers, are to be seen in the neighbourhood. A 3½-year-old bullock weighed 910 lb. in March 1907.

The Northrepps Herd, now 7 cows and 1 bull, was started by the late Richard Gurney in 1890 with a Woodbastwick bull and a Blickling cow, to which heifers from Blickling were added. When Major Quintin E. Gurney married, he took part of the herd to Bawdeswell Hall, where he now owns a herd of 4 bulls and 17 cows (two of which yielded over 1100 gallons of milk in 1918), Mrs Richard Gurney retaining the remainder at Northrepps Hall. Another offshoot from Blickling is to be found at **Kelmarsh Hall**, Northampton, where Mrs Lancaster retains the herd (16 cows and 3 bulls) established by her late husband in 1903.

In May 1895 the **Stanton Herd** of 25 White Polled cattle, owned by Robert Emlyn Lofft[1] of Troston Hall, Suffolk, was dispersed at auction by John Thornton & Company, and realised 341½ guineas. In an interesting historical notice in the sale catalogue, under the title of "The Monks' Cattle,"[2] Lofft states that early in the nineteenth century "two herds of these cattle existed in Suffolk that had quite escaped the observation of the historian of the breed"—the Rev. John Storer.[3] In support of his statement he drew attention to a picture by the elder Ward—who painted in the eighteenth century—"a large landscape, in the National Gallery, Trafalgar Square, where stands in the foreground a grand White Polled Bull with red ears; and in the same gallery another picture, much smaller, of a White Bull with red ears"; adding, "I have myself two pictures of this master, in one of which is a White Polled Cow,

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[1] His old "Thompson" cow bred always true to type—"White Polled with red ears," even when crossed with a Shorthorn bull; but this rule did not hold good with other families in the herd.

[2] This note was supplied by J. M. Webb, (then of) 7 Princes Street, Hanover Square, W.:—"The field known as Haberdon, in Bury St Edmunds, was held in monastic times by the singular tenure that the tenant should find a white bull as ofen as it should happen that any gentlewoman should visit the shrine of St Edmund 'to make the oblation of the said bull' with a view to secure a favourable answer to her prayers for offspring. On such an occasion the bull was led from the pastures here in procession through the principal streets of the town to the Church of St Edmunds. This relic of Druidism prevailed here even to the Reformation."—From Tymm's *Handbook of Bury St Edmunds*.

[3] Probably Lofft overlooked Storer's reference, made at page 317, to the Brooke House Stock, owned by Sir Roger Kerrison.

in the other a White Horned Cow, both with red ears"; from which he inferred that "stock of this sort was spread over the country to a much greater extent than writers of that period would lead us to suppose."

Two cows and a heifer were secured at Troston Hall sale, by V. P. Lort, for the Home Farm at Vaynol Park. They were not hardy, and were disposed of. They were crossed by the wild Park bull; but the experiment was unsatisfactory, the offspring proving unsound. A small herd existed, from 1895 to 1902, on the estate of the **Hon. W. F. D. Smith, M.P.** (now the Viscount Hambleden), at Great Thurlow, Suffolk. At the Troston Hall sale four cows and a young bull were secured to form it; but the cows did not prove to be good butter-makers, and at the end of seven years they were crossed with a Shorthorn, and no further attempt was made to retain them as a herd.

All the existing White Polled herds have exchanged bulls so regularly in recent years as to be practically identical—for example, Somerford, with the exceptions already recorded, used Woodbastwick bulls for some years before 1903. From that date till 1918, when a Woodbastwick bull was taken, only Northrepps bulls were used.

Storer clearly indicates the probability of the existence of an **ancient white breed** of domestic cattle in Norfolk and Suffolk at an early date, and refers to the "gigantic stature" of its presumed descendants, which stood 6 feet high, and to the extraordinary power of certain cows of the breed to perpetuate their characteristics for generations, even when mated with Shorthorn and other bulls. The equally ancient **Swedish Fjäll race** of white polled *mountain* cattle are in shape and colour-markings indistinguishable from our white polled breed of to-day, and it is open to conjecture that the two breeds had a common origin.

The Fjäll breed is very hardy, rather larger than a modern Kerry, "with a black or brown speckled face and ears and a white, more or less spotted body; fine legs; thin, neatly laid shouders; rather wide pins; long, thin, black teats; and a black or brown nose and eyelids. The bull has a somewhat thick, coarse neck, loins a trifle weak, and rather light-fleshed thighs. The cows give about 2600 to 2700 kilos. of milk per annum, with a fat percentage of from 4 to 5·9."

Dr E. A. Arenander, Professor of Cattle Breeding, Ultula, Upsala, Sweden, describes four Swedish races of cattle, two of which are polled. (*a*) The Röd Kullig or Red polled race, which occupies a line of country crossing Sweden in a north-eastern direction from Bohuslän in the south-west to Gästrikland; and (*b*) the Fjäll race or White Polls to the north of that belt over an area, the Norrland, of nearly two-thirds of the kingdom. The (*c*) Ayrshire breed occupies the greater part of Southern Sweden, together with the (*d*) Lågländа race or lowland cattle from Holland, mostly located near the south and south-west coast, and the (*e*) Rödbrokig or red flecked race which centres in Södermanland, and is kept by the large farmers. It also came from Holland throughout the eighteenth century.

A **short summary** by Dr E. A. Arenander of his views on the **immutability of the polled breeds** in the course of more than four thousand years:—

> "Linnæus laid stress on the constancy of species. Darwin, on the other hand, in his *Origin of Species*, gave prominence to their great tendency to vary. His view has been unduly emphasised during the past half century, but as a result of Mendel's researches we are now returning, though not wholly, to Linnæus' view. Various researches on polled cattle seem to favour the view that constancy rather than variability is the normal. Owing to a wrongly interpreted observation we have, from the time of Linnæus till now, believed that the polled type was derived from the horned and not the other way about, as the present writer stated and tried to prove as early as twenty-three years ago. Several investigators have now demonstrated the absurdity of the old view. The oldest primitive forms of our polled cattle I believe to be the *Leptobos Frazeri*, and some other hornless types of the Pleistocene Period in India, which have been described by Rütimeyer (1878). If Professor Pocock is right, a sketch from the Madelaine Period of the Palæolithic Age shows that polled cattle had already been domesticated in those times. From the same cave, Bruniquel in France, there also comes a piece of sculpture representing an ear of wheat and a horse-tooth of a West-European type. Besides, pieces of the crania of hornless cattle, dating back to about 2000 B.C., have been found in the Swiss pile-dwellings as well as in the Dutch rubbish heaps (terpen) and in Irish peat-bogs. Polled cattle in Northern Europe are mentioned by both Greek and Roman writers, and are at present to be found in England, Scotland, Ireland, Norway, Sweden, Finland, and Russia. In earlier times they were found in Egypt (2150 B.C.), and in Assyria and Babylonia (700 B.C.); and up till the present day we find, in French West Africa, cattle that resemble fully those of northern Sweden (Norrland). These facts show at once the wide distribution and the marked constancy, during all ages, of European polled cattle; and afford at the same time the best possible proof of the constancy among our domesticated cattle of the natural types."

Red Poll cattle have been formed into a general-purpose breed of unsurpassed merit in this country by uniting picked specimens of the old Norfolk horned breed of superior grazing cattle with the equally meritorious milking breed of polled "Suffolk Duns."

Marshall, who spent from 1780 to 1782 in Norfolk, describes the former breed belonging to the Norse and Danish settlers:—

> "The native cattle of Norfolk are a small, hardy, thriving race; fattening as freely and finishing as highly at three years old as cattle in general do at four or five; they are small-boned, short-legged, round-barrelled, well-loined, thin-thighed, clean-chapped; the head in general fine, and the horns clean, middle-sized, and bent upward; the favourite colour a blood-red, with a white or mottled face. The breed of Norfolk is the Herefordshire breed in miniature, except that the chine and the quarter of the Norfolk breed are more frequently deficient. If the London butchers are judges of beef, there are no better-fleshed beasts sent to London Market."

At that time some Herefords were altogether red, and the area of white markings in others was not so great or so well defined as now.

Arthur Young describes the "universally polled" Suffolk Dun cow of the Woodland Area "Dairy District," in north-eastern Suffolk, which in 1792 "was spread over the whole country," and had for more than half a century been famous for its butter, "justly estimated the pleasantest and best in England." The best milkers were "red, brindled, or yellowish cream-coloured." This breed, according to Bede, is believed to have been brought, viâ Holland, from Jutland (N. Denmark) in the fifth century by the Angles or English, who took with them "their slaves, their cattle, and their live stock, leaving no living thing behind them in their old homeland."

The fact that the two very distinct breeds of cattle for long maintained their individuality, although reared at no great distance from each other, is fully accounted for by their owners being of a different race and of different habits, and having little intercourse with each other.

A **short account**, written in October 1907, by **Prince Frederick Duleep Singh**, of the "herd of Suffolk Dun-Polled cattle, afterwards the property of Arthur Wakerley, Esq., of Gedding Hall, Bury St Edmunds, Suffolk":—

These cattle were, for a considerable though undetermined period, kept at Riddlesworth near Thetford, Norfolk, which is on the borders of Suffolk. No record of their early history or breeding seems to have been preserved, but the late Sir Thomas Thornhill, Bart., of Riddlesworth—whose grandfather purchased Riddlesworth about 1803—informed me that as far as he knew they "had always been there, and were the original breed of the country." It is perhaps only a curious coincidence that the ancient family of de Riddlesworth, who took their name from this place and lived there until about 1450, should have borne, for their arms, a golden bull on a green shield ("vert, a bull passant, or"), "gold" being the shade which describes the colour of this breed better than "Dun." The only other fact that I remember Sir Thomas telling me was that a slight brindling was usually the sign of a good cow and typical of the old breed. This brindling is shown in the water-colour drawing, dated 1813, of a bullock bred by a tenant on the Riddlesworth estate (which picture I had the good fortune to come across about 1898, in the possession of a descendant of the breeder of the animal, and which has since passed with the herd). At the sale of the Riddlesworth estate in 1890 the herd was dispersed. I do not know how many it consisted of then; but some, if not all, were bought by R. E. Lofft, Esq., of Troston Hall, Suffolk, who took them to that place and did his best to keep the breed going, until he sold off all his farming stock in 1895. Not hearing of the sale until the day it took place, I was only able to secure, by telegram, a certain number of the Dun Polls, but I subsequently acquired the remainder from Mr Garrett Taylor and another person. Even then the total number which I could muster was 6 cows and heifers and 1 bull. These I kept at Hockwold Hall, Norfolk, where I was then residing, until 1898, when I removed them to Old Buckenham Hall in the same county. They remained there until April 1902, when I sold the whole herd, increased by then to 14 head (which included 6 cows, 4 heifers, 1 heifer-calf, 1 bull-calf, and 2 bulls), to Lord Iveagh, K.P., of Elveden, Suffolk. Lord Iveagh only kept them until the end of 1904, when he informed me that he was anxious to dispose of them, and I was then fortunate enough to hear of a purchaser for him in the person of Arthur Wakerley, Esq., of Leicester and of Gedding Hall, Suffolk, who is the present owner of the herd. The numbers had now increased to 11 cows and heifers, 2 heifer-calves, 6 bull calves, and 3 bulls, making a total of 22. Mr Wakerley took over the entire herd except, perhaps, some of the bull calves. It will be noticed how large a number of *bull* calves were born from 1902 to 1904. This disproportion between the number of male and female calves dropped, and a tendency to abortion, were two of the chief difficulties I had to contend with during the period of over seven years in which the herd was in my hands.

In order to try and perpetuate the breed, even at the expense of its purity—acting on the advice of Mr R. E. Lofft—I crossed the Dun Polls, both ways, with Red Polls. The latter being descended from the former, one felt it was the nearest cross that could be obtained without spoiling the type. The progeny of these were kept quite distinct from the pure Duns and were themselves re-crossed with the latter, the intention being to amalgamate, eventually, the two strains. This, however, it was never possible to carry into effect, as Lord Iveagh would only have the pure Duns—the cross-breds therefore were dispersed. It was interesting to note how prepotent the Dun breed was, even the first cross taking, in nearly every case I think, the colour and characteristics of the older race. With regard to colour I found they varied from a dark cream to a rich golden colour, and with *very* occasionally the brindle markings which Sir Thomas considered typical. The milk was good and yielded a good deal more cream than ordinary Red Poll milk. The quantity of milk did not approach anything like the wonderful records spoken of by Arthur Young, but on the whole the cows were good milkers, some of them giving up to 8000 lb. in the course of the year. I kept the milk records carefully from 1898 to 1902.

FREDERICK DULEEP SINGH.

A few years later the pure breed ceased to exist, but as the last owner emigrated to Africa it was found, after repeated efforts, to be impossible to get detailed information or a definite date. It is believed, however, that it succumbed suddenly to the baneful influence of intense in-and-in breeding and tuberculosis.

Henry F. Euren,[1] the historian of the Red Polled breed, believes that the original Suffolk Polled cattle were descended from a "Scythian" stock. "Polled cattle are yet to be found in Central Russia and in that part of Hungary adjacent to Russia. That they are found in Norway and also in Iceland, which was settled from Norway in the ninth century, shows that the variety went with the nomads of old days."

Though Galloway cattle were at one time taken in large numbers by drovers into Norfolk to fatten, and probably bulls may also have been introduced, **Youatt's statement** that they were the origin of the Polled Suffolks will not stand the test of competition with the foregoing hypothesis—the Red Polls and the Galloways being different in practically all essential particulars. To our thinking the Red Polls more resemble the Polled Angus, and between these two breeds of Scotch Polls there are sufficient distinctions to indicate different origins.

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[1] To whose article on "Red Poll Cattle," in the *Journal of the Bath and West of England Society*, vol. x. (1899-1900), indebtedness is acknowledged.

John Reeves, a tenant on Holkham Estate, and a yeoman relative, **Richard England**, of Binham, began about the beginning of last century to blend the two breeds—to form the "new kind" of general-purpose beast. This was to be without the horns of "the true Norfolk Red," and the bullocks were "to fatten to about fifty or sixty stones, with as little coarse meat as could be expected." When Reeves retired in 1828 his cattle were dispersed—"eleven matchless blood-red cows in calf," 13 two- and three-year-old heifers in calf, and "a two-year-old blood-red bull, one of the most perfect animals in the Kingdom." England's herd comprised 30 cows of "a beautiful red." Another pioneer was **George**, of Eaton, near Norwich, who began during the first decade of the nineteenth century to collect a herd of so-called blood-red Polled Suffolk cows. One of the most famous was a Norfolk cow "Foulsham," bought for 25 guineas from Wale of Foulsham, near Elmham. The Norfolk and Suffolk breeds were "mixed," and close in-and-in breeding, by using home-bred bulls, was systematically practised.

The name "Norfolk Polled" was in use in 1818, and the breed was then carefully distinguished from Galloways and "Polled Derbys." It is now thought that the latter term, found in an old advertisement, applied to polled cattle of the Shorthorn type then common round Newmarket, and that they are probably closely related to the section of Polled Durhams which sprung from Muley ancestors (p. 91).

The blood-red colour was introduced into the Suffolk Dairy District, near Eye, by Sir E. Kerrison, through bulls bred at Eaton; and by Mosley, who carried a herd of the improved Norfolks bodily into the south of the Suffolk Dairy District; but showyard competition between the animals from the counties of Norfolk and Suffolk led to their admixture on the common basis of the blood-red colour. At the Royal Agricultural Society's Show in London in 1862, the blend was first publicly recognised as "Norfolk and Suffolk Red Polled." Twenty years later the name was shortened for convenience to "Red Polled," and another twenty years later it was (incorrectly) altered to "Red Poll" to do away, it was thought, with any idea that the breed was artificially polled.

In place of the common wedge shape for a milch cow, the ideal which has prevailed with Red Polled breeders is the old Norfolk form, in combination with high milking qualities and the polled condition of the earlier Suffolk Dun cattle. In this way an ideal **type of dual-purpose cattle** has been established, with the origination of which the names of B. Pond of Dunham, and Nicholas Powell of Snoring, are justly associated. Another inheritance from the Suffolk "is the remarkably large milk veins, rising in knotted puffs." Arthur Young "scarcely ever saw a famous Suffolk Polled milker that did not possess them." Similar knotted veins are to be seen on the sides of the udders of a good many of the cattle in the Island of Jersey.

The *Herd Book* was begun privately, but with the support of the breeders, by Henry F. Euren, working in consultation with the Rev. George Gilbert, in his day (1827-1893), one of the best-informed and most brilliant writers on live stock. It was started on progressive lines, which have "enabled breeders to note rapidly and accurately which of the families breed stock that will give the best results." To this end there were introduced "group letters and numbers, which tell at a glance from what foundation cow of a certain herd or district every animal in the *Herd Book* has descended on the dam's side." A self-acting process of selection was thus created in 1874 with the appearance of the first volume of the *Herd Book*. After the second issue in 1877, animals required to have "proof of twenty years' Red Polled inheritance, or four generations of Red Polled blood." A section for "Probationers" prevented the complete elimination of the progeny of meritorious animals that could not comply with these conditions, but it was closed in 1905.

The Red Polled Society of Great Britain and Ireland was formed in 1888.

> "The Council made a regulation that any record sent in for publication at the Society's cost in the *Herd Book* should show the milk yield of all the cows in the herd." In 1899 it formulated regulations for judging, which provided for the taking of morning and evening records under normal conditions and subject to independent inspection. "They also provided for pail and butter-fat tests in the showyard, and for the judging there of the cow by quality and appearance as a dual-purpose cow. One-third of a specified number of points being allotted to milk, a third to butter-fat, and a third to quality. . . . A dual-purpose cow must be able to give a fairly good account of herself in the dairy, and be able to produce calves which, when steered, will grow well and fatten into good butchers' beasts."

In the oldest herd, that of **R. Harvey Mason**, Nocton Hall, in which milk records have been kept since 1889, 23 cows averaged 4 per cent. of butter-fat in 1919. The best cow, "Berry," the herd ever produced gave in—

1907—10,552 lb. milk in 357 days = 5 per cent. butter-fat.
1908—11,757 " 351 " = 5 " "
1909—12,565 " 351 " = 4·7 " "

and in ten years averaged 8566 lb. with 4 per cent. butter-fat.

MILK RECORDS OF ASPALL HALL HERD OF RED POLLS, 1ST OCTOBER 1917 TO 30TH SEPTEMBER 1918.

The property of J. B. Chevallier, the pioneer and leader of the milk recording movement in the breed.

Identification Number of Cow.[1]	Name of Cow.	Date of Birth.	No. of Calves produced.	Date of last Calving.	No. of Days Milk recorded.	Days when Cow suckled Calf.	Days dry.	Yield of Milk in lb.
K 258	"Cassia II."	1903	12	1st Sept. 1917	365	...	...	7860
K 266	A. "Pearmain III." . .	1909	7	4th June 1918	279	19	67	5550
K 267	A. "Pansy"	1910	7	25th Mar. 1918	340	15	10	7550
K 268	"Ash Red Rose" . . .	1910	7	13th April 1918	330	10	17	6544
K 269	"Sudbourne Sachet" . .	1910	7	19th Mar. 1918	335	13	17	7210
K 676	A. "Applewoman" . . .	1911	5	22nd April 1918	340	15	10	7043
K 727	A. "Avocet"	1911	5	18th April 1918	344	21	...	6832
K 82	A. "Aphis I."	1912	4	2nd Feb. 1918	328	17	20	7313
K 1034	A. "Aphrodite I." . . .	1912	3	17th Nov. 1917	271	24	70	6433
K 1179	A. "Aphis II." . . .	1913	3	12th May 1918	347	18	...	6410
K 2019	A. "Aphis III." . . .	1914	2	25th June 1918	321	44	...	5002
K 2073	A. "Aurora II." . . .	1914	2	22nd July 1918	323	42	...	5561
K 2074	A. "Aphrodite II." . . .	1915	2	25th July 1918	326	39	...	6619

[1] East Anglian Milk Record Society.

13 cows averaged 6609 lb. annually in war time.

Another special cow, "Gemma," still in the herd, averaged 8360 lb. for fourteen years, and during her best year after the seventh calf—10,137·5 lb.

"C. F. Newton's great milker, 'Flaxmoor Ruby,' in the Saham Toney herd, has established some fine records. In 1912-13, during 44 weeks, she gave 14,070½ lb.; in the 1913-14 lactation of 47 weeks her yield was 13,537½ lb.; and in 1914-15, in 53 weeks, she yielded 13,778 lb. In the first month of each of these three periods she was suckling her calves. 'Flaxmoor Ruby,' in her sixteenth year, started the 1919 recording year with a yield of 352 lb. for the first week. The milking properties of 'Flaxmoor Ruby's' progeny are shown in the performances of 'Meadow Ruby,' who gave nearly 10,000 lb. when first tested. Since then she has won inspection prizes, thereby indicating her dual-purpose characteristics." Newton's "Kitchener's Daffodil" gave 1000 gallons in 365 days, and the milk contained 5 per cent. of butter-fat.

Lieut.-Col. C. Brook, of Kinmount, Annan, Dumfries, wrote to the Society that "the local official Recorder reported that his test of the entire herd had yielded a better result than any he had ever tested. Two of the cows registered over 5 per cent. of butter-fat. In-calf heifers had been running out in the park all winter, and were looking just as fit and well as any of his Galloways."

The breed is noted for abnormally prolonged periods of lactation. The cow "Crocus," whose dam was of the old Suffolk Dun milking blood, yielded, after dropping her third and last calf, in May 1890, during a period of nine years and four months of continuous profit, 50,427 lb. of milk—with, during the last five years, a percentage of 4·3 of butter-fat.

A pure unregistered cow belonging to A. Beverley Ringer reached a 2000-gallon record in October 1921, with still 28 days to go before calving, the fat yield being 5·45.

Some cows have a **nervous habit** of holding up their milk for one or two milkings if moved to strange surroundings: when, for example, they are taken to milking competitions at shows, the percentage of butter-fat as well as the yield of milk is altered. The Red Poll breed suffers acutely in this way. At the Dairy Show in 1898 the cow which gained the Breed Silver Medal for butter-yield showed the abnormal difference in percentage of butter-fat between 2·26 in the morning and 4·26 in the evening meals. Another winner "gave 17·5 lb. at the first morning trial, 25·5 lb. at the second; 27·4 lb. at the first evening trial, 24·7 lb. at the second; and while the morning's fat was only 2·54 per cent., the evening's was 4·45."

MILK RECORDS OF THE GRESSENHALL HERD OF RED POLLS, FROM 1ST OCTOBER 1917 TO 1ST OCTOBER 1918.
Dispersed in 1919 by the Executors of the late John E. Hill, and sold at very high prices, one animal making 1000 guineas.

No.[1]	Name of Cow.	Date of Birth.	No. of Calves produced.	Date of last Calf.	Days Milk was recorded.	Days Cow suckled Calves.	Days dry.	Butter-Fat Test.		Total Milk in lb.
								A.M.	P.M.	
477	G. "Red Berry"[2] . .	14th July 1911	3	5th Nov. 1917	338	8	19	4·3	3·6	10,110½
495	G. "Tottie" . . .	26th Aug. 1912	3	9th Sept. 1918	333	17	15	5·4	5·0	9,669¾
505	G. "Southgate 6th"[3] . .	26th Aug. 1914	2	19th Sept. 1918	331	11	...	7·6	4·9	9,364¾
470	G. "Peggotty" . . .	18th Sept. 1912	3	7th July 1918	361	4	Nil	4·3	5·0	9,283½
471	G. "Roseanna" (Red Rose).	24th Sept. 1913	2	20th Sept. 1917	361	Nil	4	4·6	3·7	9,108¼
480	G. "Rosanna"[4] . . .	3rd Nov. 1912	3	9th June 1917	364	Nil	1	7·0	4·4	8,346½
409	G. "Red Star" . . .	4th Aug. 1911	5	16th Mar. 1918	296	4	65	4·4	2·9	8,300¼
478	G. "Rosebloom 2nd" . .	5th Dec. 1911	4	19th Aug. 1918	318	8	39	...	...	8,207½
506	G. "Rubina"[5] . . .	14th July 1914	1	16th Oct. 1917	340	9	Nil	3·8	3·3	8,163
492	G. "Daisy Bell" . . .	6th Sept. 1912	2	27th Nov. 1917	298	9	58	3·6	2·4	8,067
490	G. "Diana" . . .	5th Aug. 1911	4	27th June 1918	313	4	48	4·7	6·1	8,031¾
481	G. "Lynda". . . .	29th June 1913	2	24th Sept. 1917	304	7	54	8·0	4·7	7,934½
498	G. "Rosebloom 3rd" . .	5th Aug. 1913	3	23rd Aug. 1918	333	4	28	5·6	6·6	7,776¼
472	G. "Strawberry" . .	19th Sept. 1908	5	3rd Mar. 1918	300	4	61	3·9	4·5	7,476
501	G. "Guist"	15th Sept. 1906	10	25th Feb. 1918	358	4	3	4·0	3·1	7,197½
508	G. "Ivy"[6]	10th Aug. 1914	2	28th Sept. 1918	324	4	8	7·4	3·8	6,782
500	G. "Mattie" . . .	24th Aug. 1914	2	28th Jan. 1918	290	16	59	4·4	3·9	6,770
488	G. "Pearl"	26th July 1912	3	12th June 1918	284	4	77	4·3	3·1	6,688
479	G. "Molly". . . .	7th July 1912	3	13th Sept. 1918	254	4	107	...	...	6,666
507	G. "Rosa"[7] . . .	21st Dec. 1914	2	19th Sept. 1918	336	10	2	5·9	3·6	6,543¼
496	G. "Dagmar" . . .	28th Aug. 1912	3	4th Mar. 1918	262	4	99	4·6	3·65	6,480½
504	G. "Tott"[8]. . . .	11th Sept. 1914	1	30th Oct. 1917	277	59	Nil	5·2	4·3	6,206
502	G. "Blossom" . . .	16th July 1914	1	23rd Oct. 1917	286	56	Nil	6·25	5·1	5,726½
484	G. "Berry". . . .	17th Oct. 1911	3	5th Sept. 1917	365	Nil	Nil	5·5	3·9	5,443¾
503	G. "Saint Poppy"[9] . .	24th Aug. 1914	1	24th Oct. 1917	255	77	10	5·2	4·75	5,150¼
485	G. "Red Poppy" . .	18th Oct. 1908	7	21st Mar. 1918	311	13	41	5·4	3·0	5,108¾
475	G. "Red Skin" . . .	3rd June 1914	3	14th Sept. 1918	333	4	28	6·0	5·0	5,106¼
509	G. "Profit"[10] . . .	11th Sept. 1915	1	16th Feb. 1918	175	52	Nil	4·8	3·3	4,223½

[1] Norfolk County Recording Society. [2] Butter-fat tests taken on 24th and 25th July 1918, by Messrs Sutton & Sons, County Analysts, Norwich. [3] Heifer with not full year; two calves in year. [4] No calf in year. [5] Heifer with not full year. [6] Heifer with incomplete year; two calves in year. [7] Heifer not full year; two calves in year. [8] Heifer not full year. [9] Heifer with incomplete year. [10] Heifer with incomplete year.

20 cows in herd whole year averaged 7588½ lb. 7 heifers with first calves averaged 6848 lb. Artificial food was very short all the year.

MILK RECORDS OF "RED POLLS" AT PARK FARM, GRESSENHALL, FROM 1ST JULY 1918 TO 1ST JULY 1919.

COWS.

Lot.	Gave lb.	Lot.	Gave lb.
1. G. "Strawberry 5th"	9,981¼	13. G. "Rosebloom 3rd"	7,577¼
2. G. "Red Berry"	10,159¾	14. G. "Roseanna"[1]	11,130¼
3. G. "Red Star 2nd"	11,179¾	15. G. "Red Skin"	8,131½
4. G. "Rosebloom 2nd"	8,023¾	16. G. "Rubina"	6,503¾
5. G. "Molly"	10,211	17. G. "Blossom"	7,764½
6. G. "Pearl"	13,459½	18. G. "Saint Poppy"	7,641¾
7. G. "Tottie"	9,400¼	19. G. "Ivy"	6,023¼
8. G. "Dagmar"	6,480	20. G. "Matty 6th"	6,694¼
9. G. "Daisy Bell"	8,332¼	21. G. "Southgate 6th"	9,368
10. G. "Peggotty"	11,627¼	22. G. "Tott" (Suckling Calves)	...
11. G. "Rosanna"	9,269½	23. G. "Rosa"	5,800½
12. G. "Lynda"	8,888¼	30. G. "Profit"	7,163¾

[1] 12th Nov. 1918 to 1st July 1919, 10,040½ lb. were given, or 34 lb. daily.

Average for the 23 cows in the herd the whole year 8731 lb.

HEIFERS.

Lot.	Gave lb.
24. G. "Red Flower"	4,981½—1st Nov. 1918 to 1st July 1919.
26. G. "Flower Girl"	4,612¾—9th Dec. ,, ,, ,,
28. G. "Red Rosebud"	5,755¼—9th Nov. ,, ,, ,,
29. G. "Red Peony"	5,856¾—27th Oct. ,, ,, ,,
31. G. "Belle" (Suckling Calves)	...
32. G. "Gem"	2,018¼—7th April 1919 ,, ,,
33. G. "Anna"	3,476¼—15th Feb. ,, ,, ,,

A striking example of **prepotency** in Red Poll cattle was given by H. F. Euren. In the U.S. of America, "an imported Red Polled cow, served by Jersey and other horned bulls, from 1848 produced year after year polled bull calves, and these in their turn having served all sorts of horned cows, became sires of other polled cattle, usually red in colour, generation after generation for thirty years." Andrew Ralston, writing of the Glamis herd of Polled-Angus cattle, says: "We never cross with anything but a black bull; and all crosses, whether first, second, or third, come black, and they never have horns."

Red Poll Crosses with other breeds show some interesting and unique features. A bull, "Excellency" (6211), from Mason's herd was used, beginning at one year old, by William Fleming of Tudhoe, Durham, at Burn Hall, on 33 heifers (25 West Highland of various colours, 7 Shorthorn, and 1 Polled-Angus), which produced calves during the years 1900, 1901, 1902. All were red, and, if the Polled-Angus calf is excluded, the polled and horned calves were each 16 in number. Of 15 heifers in 1900, 10 had calves, and 5 of these developed horns; only 1 out of 6 calves in 1901 grew horns; but in 1902, of 12 heifers 10 had calves which grew horns. This is a decidedly larger proportion of horns than usually appears in the progeny of either of the Scotch Polls when mated with horned cows; but they were mostly "scurs," *i.e.*, without horn-core foundations. One calf of a Highland cow had two white feet. The same bull on a black Kerry heifer produced a black bull calf with scurs, but from a red Dexter the calf was red and polled. **Sir Eustace Gurney** "tried the cross between the Red Poll bull and Aberdeen-Angus cow and found, as he was told one should expect, that the offspring were black with black noses; they were, in fact, indistinguishable from the Aberdeen-Angus, excepting only that when quite small they had a rusty appearance due to longer red hairs in the coat."

J. W. Lee, of Meigs County, Ohio, reports:—

> "I had sixteen Shorthorns and a few grade cows, which I bred to the Red Polled bull 'Glenmore.' The calves were the finest that had ever been dropped on my farm up to that time. They were all red in colour, uniform in style and shape, and all muleys, from horned cows of all colours. In this 18 head of calves, 13 were heifers, which averaged at twelve months old 1000 lb. The bull calves, when sold, averaged 100 lb. for each month of their age." (See Appendix U, "Baby Beef.")

It has been demonstrated that **steers** of about eighteen months, put up after grazing to feed off, will grow till about two years old, and finish rapidly in prime condition, making during the last six months an average increase of nearly 2 lb. per head per day; and also that prime carcases command the highest prices in the London market.

The high general-purpose standard of the breed, and the polled condition, together with the fashionable red colour, make Red Poll cattle peculiarly **suitable for the River Plate** countries, where a brisk opening up of an export trade has been in progress for a few years, and an independent Argentine Red Polled Breed Book and Association are assured.

Improvement.—The rate at which the Red Poll breed has come to the front and has taken its place among the most important breeds in this country is quite remarkable. **Low**, writing in 1845, after giving the breed under the name of Polled Suffolks a poor character in respect of almost every quality except that of milk-production, suggested the great probability of its immediate extinction. Recent years have seen not only improvement in quality, but a large extension of the numbers of good herds and of first-rate animals.

The **leading** present-day **breeders** of Red Polls are:—H.M. the King, Sandringham; J. P. Arkwright, Hatton House, Warwick; Edward C. Ash, Dallinghoo, Suffolk; Major Astley, Plumstead, Norfolk; E. E. Barclay-Brent, Pelham Hall, Buntingford; Cuthbert Blundell, Halsall House, Ormskirk;

A. E. Bowen, Colworth, Shambrook, Beds; Marquis of Bristol, Ickworth Park, Bury St Edmunds; Thomas Brown and Son, Marham Hall, Norfolk; J. B. Chevallier, Aspall Hall, Suffolk; Sir Walter O. Corbet, Bart., Acton Reynold, Shrewsbury; J. B. Dimmock, Shotford Hall, Norfolk; Marchioness of Graham, Easton Park, Suffolk; Sir Eustace Gurney, Bart., Sprowston Hall, Norwich; Rt. Hon. Lord Hastings, Melton Constable, Norfolk; Lady Margaret Heytesbury, Heytesbury, Wilts; The Earl of Leicester, Holkham Park, Norfolk; The Earl of Lonsdale, Barleythorpe, Oakham; R. Harvey Mason, Necton Hall, Norfolk; T. S. Matthews, Sporle, Norfolk; The Duchess of Newcastle, Clumber Park; Chas. Pettiward, Finborough Hall, Suffolk; Rt. Hon. E. G. Pretyman, M.P., Orwell Park, Ipswich; J. E. Quested, Cheriton, Kent; Dowager Lady Quilter, Bawdsey Manor, Woodbridge; Rt. Hon. the Earl of Radnor, Longford Castle, Salisbury; Lord de Ramsey, Haverland Hall, Norwich; Sir Joshua Rowley, Bart., Stoke by Nayland, Suffolk; A. Carlyle Smith, Sutton, Suffolk; Gerald D. Smith, Skewsham Court, Worcester; The Earl of Stradbroke, Henham Park, Suffolk; Sir T. Courtenay Warner, Bart., M.P., Brettenham Park, Suffolk; J. Lachlan White, Bredfield, Woodbridge; R. Eaton White, Boulge, Woodbridge; Wm. Woodgate, Framlingham.

New Herds of Fine Cattle have been started by:—Capt. J. E. Baird, Bantaskin Park, Falkirk; Lieut.-Col. C. Brook, Kinmount, Annan, Dumfries; Miss Elsie M. Cobbold, Needham Market, Suffolk; Major H. Colmore, Antwick Manor, Berks; Major R. W. Cooper, Eling House, Hermitage, Berks; Culford Estate Trustees, Culford Park, Bury St Edmunds; Major J. Gordon Dugdale, The Abbey, Cirencester; Major W. Elwes, Oakdale, Ockley, Surrey; Mrs R. M. Foot, White Hill, Berkhamstead, Herts; W. L. Horbury, Brentwood, Bidston, Birkenhead; P. E. Lepherd and H. Hale, Findon, Worthing; J. M'Kelvie, Duckyls, East Grinstead; Major J. A. Morrison, D.S.O., Basildon Park, Berks; Col. B. J. Petre, Westwick, Norwich; M. C. Pilkington, Hutton Hall, Hutton, Essex; Joseph Watson, Sudbourne, Suffolk.

CHAPTER IX

CATTLE—SCOTCH POLLED ABERDEEN-ANGUS AND GALLOWAY

Aberdeen-Angus—Habitat—Colour—Ancestors—Early Breeders—Modern Prize-Winners—Standard of Excellence (Bull)—Points (Cow)—Comparison with the Galloway—Their Crosses—*Herd Book* and Polled Cattle Society—**Aberdeen-Angus Red Polls**—Origin—**Galloways**—Distinctive Characteristics — Colour — Resemblance to West Highlanders—Prepotency—Early Breeders—Milking Qualities—*Herd Book* —Blue-Grey and other Crosses—Quotations from Gilbert Murray and Dr Gillespie—Biggars' Method of Feeding—**Belted Galloways**—Low and Gilbert on other Belted Cattle—Characteristics—Breeders in England and in Galloway.

THE **Aberdeen-Angus Breed**,[1] from Aberdeenshire, Forfarshire, and the district largely embraced within the adjoining counties, is most probably the result of the amalgamation of a number of very different, local, polled and also horned breeds, associated with careful selection and in-and-in breeding, together with, it is asserted, the infusion, within comparatively recent times, of a greater or less degree of alien blood. The difference of climate and surroundings, together with the influence of artificial selection by man, and probably the importation of fresh blood from abroad, is sufficient to account for the diverse appearances in all those allied varieties.

The absence of horns and the prevailing almost uniformly **black colour**, although ranking among the most persistent characteristics of the Northern Scotch Polls, were by no means uniform features in olden times. Black cattle without horns were recorded nearly four hundred years ago,[2] but long after the beginning of last century very many of the cattle in the home of the breed had horns. Their colours were extremely variable: some were yellow, red, or brown; others brindled (red and black, sometimes with white mixed or broken in an irregular flaked fashion), black-and-white, "belted" and "rigged"—the latter black with a white or brown stripe along the back. Certain herds had a brown ring round the muzzle associated with the brown ridge. The late Lord Southesk, himself at one time a successful breeder of polled cattle, writing on 19th July 1889, reflected upon the change of colour in Highland cattle from black to reds and yellows, and the possibility of the blacks becoming nearly extinct, and added: "Just as the red, brindled, and dun Polled Angus, common in my youth, are now hardly ever seen."

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[1] See also *The History of Aberdeen-Angus Cattle*, by Macdonald and Sinclair. (Vinton & Company, London.)

[2] A legal document in vol. iii., p. 344, of the *Spalding Club Illustrations of the Topography and Antiquities of the Shires of Aberdeen and Banff*, mentions the acceptance by John Cumyne in 1523 of *unum bovem nigrum hommyll*—a black hummel (hornless) ox—valued at 40s. 8d. Scots.

According to the early records, the largest and best varieties of the polled cattle were to be found in the low country. The smaller horned cattle which resembled the old Highland breeds occupied the uplands.[1] **Buchan cattle**, about half of which were polled at the end of the eighteenth century, justly claimed superiority. They have been represented from time immemorial by two polled breeds possessing good milking powers, but of very different size. These were locally termed "humlies," while the early Polled Angus cattle were named "doddies."[2] In the *General View of the Agriculture of Angus*, published in 1813, it is stated with regard to the general stock that "little attention was then paid to the selection of the males or females by whom the breed was propagated." The superlative qualities of the modern cattle, we may safely conclude, have been developed in recent years, by selection and moulding from the superior herds of those proprietors who, before the time referred to, took an interest in the improvement of live stock.

The Highland Society did not officially recognise the breed till 1835, but by 1852 that body reported of it: "We cannot but regard it as the most valuable breed of Scotland, combining as it does in a great measure the constitution of the Highlander and the feeding properties of the Shorthorn."

The Aberdeen-Angus of the present day occupies among Scotch cattle very much the same position that the North Devon does among English breeds for quality of flesh, refinement of style, perfection of the rounded type of symmetry, and, it might be added, for the excellence of its marbled beef; yet it must not be forgotten that these qualities, like those of all British breeds, however distinct and however permanent they may be, are the results of the commingling of blood of various kinds. No single breed is pure if we go back for but a few generations. Each breed has its ups and downs in the record of its development, and it is pretty generally recognised among experts that the early years of the present century marked one of the periods of depression in the history of this Northern Polled breed, during which regression was probably more active than progression.

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[1] A valuable paper on "Aberdeenshire Horned Cattle," by James R. Barclay, *Banffshire Journal* Office, appears in the *Transactions of the Highland Society*, vol. xviii., 1906.

[2] In 1752, G. B. Simpson, Broughty-Ferry, Forfar, mentions transactions in "humble" oxen and "dodded" heifers.

It is recorded that less than one hundred years ago **crossing** was carried on with Ayrshire, Guernsey, Fife,[1] Shorthorn, and Galloway cattle. How much of this blood has been maintained in the best animals of the present day is a matter for conjecture. It is true that the well-known attempt by Lord Panmure to introduce a Galloway cross was not attended with success; but, on the other hand, there is good reason to believe that the very extensive and successful use of Shorthorn bulls in breeding grazing cattle for the Southern markets, led to the incorporation of Shorthorn qualities into the breed during the early years of its improvement. At times very distinct Shorthorn characters appear by atavism in polled cattle of good blood and long pedigrees, and disappear in the next generation.[2] The use of a Shorthorn bull on virgin polled heifers has also been accredited with the power of stamping Shorthorn qualities upon their future calves by bulls of their own breed. Certain telegony experiments tend to show this to be merely a popular fallacy. (Nevertheless see Plate 14A.)

In-and-in breeding has been adopted to fix the good qualities from time to time spontaneously produced by Nature under the influences of the tendency to change brought about by crossing. In the matter of consanguineous relationships, the Aberdeen-Angus is not an exception to the rule which applies to the Shorthorn and other well-known breeds. **Hugh Watson** of Keillor, in Forfarshire (born 1789, died 1865), was the Colling of the Northern Polled breeds, carrying out the principles laid down by Bakewell and his followers. His father bred black polled cattle as early as 1735. Hugh Watson's first exhibit of two oxen at the Highland Show was in 1829. One of them and a heifer went to Smithfield "where he was an unsuccessful exhibitor for many years." They were the first of the breed that appeared at that Show. He also introduced it to Ireland by "winning the Purcell Challenge Cup at Belfast with a son of the *prima* cow 'Old Grannie.'"

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[1] The Fife Horned breed is now extinct. They were large black cattle, rather slow in coming to maturity, but unsurpassed as grazers after they were three years old. See Plate XLV.

[2] The Author remembers having seen a black-and-white cow of this kind some years ago, which had well-developed horns, and quarters unmistakably like those of a Shorthorn. Her immediate ancestors as well as her descendants were animals of the pure type and of superior quality.

"The impetus given to the breeding of pure stock by Charles Colling's great sale of Shorthorns in 1810, when the bull 'Comet' realised £1000, had also its effect on the introduction of a more systematic method of breeding in the case of Aberdeen-Angus cattle. When Hugh Watson was nineteen years of age, in 1808, he became tenant of the farm of Keillor. To his new home he took with him, from his father's herd, 6 cows and a bull, all black and polled. To these he added 10 heifers and a bull, which were acquired in Trinity Muir Market, Brechin, and it is probable that they were descended from the stock which had been so long bred by the Earls of Southesk, at Kinnaird Castle. With these 16 cows and 2 bulls, Watson began his system of breeding for a specific result, and for the fixation of a definite type of animal. That he was successful, history has shown, for there is no herd of the breed which is not indebted to Keillor blood," which in his hands gained over 500 prizes.

But it was reserved for **William M'Combie**, of Tillyfour (born 1805, died 1880), to make the breed known to the outside world. After a long and successful showyard career, he eclipsed all the previous performances of the breed by carrying off two Champion Prizes of £100 each at the Paris International Exhibition in 1878—(1) For the best group of foreign cattle; and (2) for the best group of beef-producing animals—both bred by the exhibitor.

"M'Combie founded his herd in 1830, but it was not until some years after that he turned in earnest to the improvement of its feeding capabilities. The keystone of his fortunes as a breeder was laid in 1844, when at the Ardovie Sale, he purchased the yearling heifer 'Queen Mother.' For a time this cow failed to breed and she was put to the yoke, but in time she gave birth to the heifer calf 'Lola Montes' (208), the grand dam of 'Pride of Aberdeen' (581), the foundress of the premier family produced at Tillyfour. From the year 1832, when M'Combie won his first prize at the local show at Alford, through that prosperous period of the sixties and seventies at Smithfield and Paris, down almost to the time of his death in 1880, he persevered with undaunted pluck, and those 40 cups, 130 medals, the 100-guinea cup awarded by the late Prince Consort at the International Exhibition at Poissy in 1862, and the two 100-guinea awards won at Paris in competition with sixty other varieties of cattle, including the leading British and Continental breeds, formed tangible proof of the success of his efforts.

"At the International Exhibition at Poissy in 1857, many prizes fell to M'Combie for oxen. One of them, first in the class over three years old, was the heaviest animal of the British breeds, weighing 2744 lb. It was sold at £64, and M'Combie's second prize three-year-old at £56. J. Stewart, Aberdeen, was also an exhibitor of Aberdeen-Angus, while crosses of the breed were shown by him and by William Heath, Norfolk, so that even in those early times feeders in the South of England were becoming alive to the valuable cross produced by the use of the Aberdeen-Angus. In 1862, M'Combie led in the four different classes for oxen and cows and heifers. His first prize ox, which had been champion at Birmingham in 1861, and best Scots ox at Smithfield, won the Prix d'Honneur, or the great gold medal, and also the cup offered by the trustees of the late Prince Consort for the best animal exhibited in all the classes irrespective of breed, French or British. This was equivalent to winning the Fat Stock Championship of the world. After winning prizes in cups to the value of £285, the Tillyfour ox bred by Tough, Deskie, Aberdeenshire, was sold

> to the Emperor's butcher for £84. Thus, in 1856, 1857, and 1862, M‘Combie gained every first prize for Aberdeen-Angus breeding and fat cattle awarded by the French Government, and earned the title of ‘the great deliverer’ of the Aberdeen-Angus breed. The climax was reached in 1878 when a herd was placed first of the breeds of the world. Sir George Macpherson Grant, Bart., entered six animals, M‘Combie nine—though only eight appear to have been sent—and George Bruce one, making in all fifteen animals of the breed which appeared among the *Races sans cornes.* Every one was awarded either a prize ticket or an ‘honourable mention.’
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> "In the inter-breed competitions at the Paris Exhibition of 1878, a Prize of Honour worth £100 was offered by the French Government for the best animals for breeding purposes bred by exhibitor in the sections of cattle other than French. For this trophy there competed representatives of the Aberdeen-Angus, Shorthorn, Hereford, Devon, Sussex, Ayrshire, Highland, Suffolk or Norfolk, Kerry, Dutch, Flemish, Danish, Berne, Fribourg, Swiss, Piedmontese, and Portuguese breeds. The prize was awarded to M‘Combie's group, that of Sir George Macpherson Grant being reserve champion."[1]

The only occasion on which British and French cattle had any opportunity of trying their respective merits was in the competition for the £100 prize for the best group of beef-producing animals bred by the exhibitor. The adjudicating bench had by this time increased to 31. By a majority of 24 to 7, the Aberdeenshire animals won. And only one of M‘Combie's best "beef-making group" of six was over two years and a few months.

During recent years no breed has been so successful as the Polled Aberdeen-Angus in competing for the highest honours at the London and Birmingham **Christmas Fat Shows,** and at similar "expositions" in America. In this country the names of Clement Stephenson, Newcastle; George Wilken, Waterside of Forbes; Sir W. G. Gordon Cumming, Bart., of Altyre; the Earl of Strathmore, Glamis Castle; Colonel M‘Inroy, C.B., of The Burn; and J. J. Cridlan of Maisemore Park, are closely associated with these honours.[2]

A **summary** of the relative successes of the different breeds up to 1921 at the two most famous Fat Stock Shows in the world—the **London Smithfield** and the **Chicago International**—is illuminating:—

Smithfield.

Grand Championship.—Aberdeen-Angus, 15; Shorthorn, 7; Hereford, 2; Cross-breds, 3.

Carcase Championship.—Aberdeen-Angus, 6; Shorthorn, 0; Hereford, 0; Aberdeen-Angus Crosses, 10.

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[1] Edited and extracted from *The Aberdeen-Angus Review*, No. I., June 1919, published by The Aberdeen-Angus Cattle Society.

[2] Full details of the wonderful showyard performances of this breed on both sides of the Atlantic up to 1886 may be seen in Auld's work, *The Breed that Beats the Record*, published by Aldine Co., Detroit; and more recently in *The Aberdeen-Angus Review*, No. I., June 1919, published by The Aberdeen-Angus Cattle Society.

Chicago Grand Championships.

Single Steer.—Aberdeen-Angus, 12; Hereford, 3; Shorthorn, 2; Crossbreds, 3.

Carloads. — Aberdeen-Angus, 16; Hereford, 3; Shorthorn, 1.

Steer Herds.—Aberdeen-Angus, 12; Hereford, 2; Shorthorn, 2; Crossbreds, 2.

Carcase — Aberdeen - Angus, 17; Shorthorn, 1.

In **a protest** against the suggested omission in future Chicago International Shows of the grand championship in the carload section, **J. R. B.** in the *Scotsman*, 5th September 1920, pointed out that at the 1919 Show

> "There were no fewer than forty-six carloads of fifteen steers each, representing a total of close upon seven hundred animals. The display was representative, for, to mention only the principal breeds, there were in the two-year-old steer class four carloads of Shorthorns, four of Aberdeen-Angus, and nine of Herefords, while in the class for yearling steers there were twenty carloads of Aberdeen-Angus, five of Herefords, and four of Shorthorns. Both championship and reserve championship were won by lots of Aberdeen-Angus. The competition is a highly representative one, and is taken part in by the different leading beef breeds. In the two-year-old class, Aberdeen-Angus were first and third, and Herefords second and fourth, and in the yearling class Aberdeen-Angus were first and fourth, Shorthorns second, and Herefords third.
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> "At fourteen out of the eighteen shows the Aberdeen-Angus has provided the champion in the carload competition; at seventeen out of the eighteen carcase competitions it has proved invincible; in the single steer grand championship it has come out on top eleven times in the eighteen shows, and in sixteen competitions for steer herd championships it has won on twelve occasions. In other words, the Aberdeen-Angus breed has won fifty-four grand championships, as against sixteen for the three other breeds which have figured in the championships of the four sections detailed."

At Johannesburg in 1920, with an exceptionally fine exhibit, the Aberdeen-Angus for the second time in succession, and at the second time of asking, "carried off the Blue Ribbon of the Rand Show in the shape of the Dunne Challenge Cup" in competition with groups representing many other breeds.

As a breeding herd, that of Sir George Macpherson Grant at **Ballindalloch** occupies the premier position in Scotland, and it is also the oldest.

"*Herd Book*" *Standard for Aberdeen-Angus Bull.*

"*Registered Pedigree. Colour*—Black. White is objectionable, except on the under-line behind the navel, and there only to moderate extent; a white cod is most undesirable. *Head*—Forehead broad; face slightly prominent, and tapering towards the nose; muzzle fine; nostrils wide and open; distance from eye to nostril of moderate length; eye mild, full, and expressive; ear of good medium size, well set, and well covered with hair; poll well defined, and without any appearance of horns or scurs; jaws clean. *Throat*—Clean, without any development of loose flesh underneath. *Neck*—Of medium length, muscular, with moderate crest (which increases with age); spreading out to meet the shoulders; with full neck vein. *Shoulders*—Well laid in, covered on the blades and on the top, which should be on a line with the back, and moderately broad. *Chest*—Wide and deep. *Bosom* (*or Brisket*)—Standing well out between the legs, and moderately covered with flesh and fat. *Ribs*—Well sprung from the backbone, arched and deep, neatly joined to the crops and loins. *Back*—Broad and straight from crops to hooks; loins strong; hook-bones moderate in width, not prominent, and well covered; rump long, full, level, and rounded neatly into hind-quarters. *Hind-Quarters*—Deep and full; thighs thick and muscular, and in proportion with hind-quarters; twist full. *Tail*—Fine, coming neatly out of the body on a line with, and hanging at right angles to it. *Under-line*—As nearly as possible straight; flank full and soft. *Legs*—Short, straight, and squarely placed; hind legs slightly inclined forward below the hocks; forearm muscular; bones fine and clean. *Flesh*—Even, without bumps or patchiness. *Skin*—Of moderate thickness and mellow touch, abundantly covered with thick and soft hair. *General Appearance*—Gay, well-bred, and masculine." With the exception of those relating to sex, "the **points of the female** are identical with the above."

Only a few characteristic features call for special mention. The normal colour is black, but the rusty brown referred to in varieties of the old breeds, and also white patches of moderate dimensions about the udder and belly, are tolerated. Though to appearance an animal of this breed looks small, yet, owing to its short legs and compact rounded form, its weight classes it among the larger breeds. The hook-bones are not so wide or prominent, and the quarters not so square as in the Shorthorn. The absence of patchiness and the equality and levelness of flesh are proverbial.

"The breed is held in the highest estimation by meat experts and retail butchers on account of its unrivalled fleshing properties. Carcases give unusually high returns of dead- to live-weight, the world's record of 76¾ per cent. being held by an Aberdeen-Angus. Short on the leg, and fine in the bone, cattle of the breed give a far greater weight than a first impression would lead one to suppose. Cases are on record of yearling steers weighing over 1600 lb., and of a two-year-old steer 2240 lb. The meat is not only of exceptional quality and beautifully mixed, but it is concentrated in greatest amount on the most valuable parts, while the marked absence of waste throughout the carcase constitutes it a prime favourite with the retail butcher.

"The Market Reports issued by the Board of Agriculture show that cattle of the Aberdeen-Angus type bring from 2s. to 3s. per cwt. more than other leading beef breeds. The London Christmas Market is the most important British market for live beef cattle, and at the market held prior to the coming into operation of the Government Control Prices, the quotations were—per stone of 8 lb.: Polled Aberdeen, 9s. 8d. to 10s.; Herefords, 9s. to 9s. 4d.; and Shorthorn, 8s. 8d. to 9s. Important sales of bulls and of females take place at various centres early each Spring, and there is also a series of sales each Autumn."

With now and then prominent exceptions, the milking qualities are low as regards quantity, the result of breeding for beef and of the prevailing custom of suckling the calves, but the quality of the milk is good.

Bulls of the breed are extensively used for crossing purposes, and even with the most pronounced horned breed 75 per cent. of the calves by an Aberdeen-Angus sire are black and hornless. An outstanding characteristic of Aberdeen-Angus bulls is their prepotency, imparting to their cross-bred offspring the properties of hardiness of constitution, vigour under varying conditions of climate and feed, early maturity, and meat-producing excellencies.

In comparison with the Galloway, the breed weighs heavier at an early age owing to its greater rapidity in coming to maturity, though a difference in the size of breeding-stock is not marked. The bones are finer, the skin thinner, the hair shorter, and the poll more pointed.

Lord Southesk's letter, already quoted, says on this subject:—"The 'Gothic' arch form of poll is thought preferable to the 'Roman' arch as bespeaking a remoter distance from a horned ancestry. Polled bulls with flat-top heads often have actual 'scurs,' or, if not having actual scurs, they bear hairy twists on each side of the skull. It is always held as an indication of imperfect purity of blood (originated, perhaps, at a time long before the *Herd Book*) to have a flattened poll. Perhaps the Galloways were at some period a horned breed. They resemble the Highlanders in several particulars."

The Crosses resulting from mating Aberdeen-Angus and Shorthorn cattle are similar in size and appearance, whichever breed supplies the male, provided the Shorthorn cow put to a polled bull be a big-framed animal. An average Angus cow will throw a full-sized cross to the Shorthorn bull, but the progeny of a small Shorthorn cow and Angus bull is small in the bone and liable to be undersized. Nearly all first crosses from pure parents are black, but a few are "grey-hairs," or "blue-grey," like the first-cross Galloway; and the majority are without horns. Compared with black crosses, the blue-greys seem to take more after the Shorthorn, and as cows they are more liable to throw horns in their progeny. The polled bull on an Ayrshire cow produces a small, thinly-made-up animal, and Angus crosses from other milking breeds or cross-bred dairy cows are, on the high authority of the late John Ross, of Meikle Tarrel, Easter Ross, difficult beasts to make anything of for the butcher until they are three years old. This central fact accounts to a large extent for the early non-success of the Polled Angus bull when used to cross the common cattle of Argentina. As country cows become graded up by the use of Shorthorn bulls the Angus bull inevitably establishes himself as a prime beef-producing sire. As an early indication of coming events it is stated on good authority, that during the year 1906, one hundred and forty-six head were purchased at public sales or by private bargain from English and Scotch breeders for export to Argentina.

The Aberdeen-Angus crosses with the Dexter breed frequently seen at Smithfield are models of small cattle. The black is very persistent, as second crosses are usually black, but third and later crosses diverge into mixed or broken colours, and some become white. The white heifer with black muzzle and grey fringes shown on Plate LIX. (4th Ed.) is an exception to this rule, being a second-cross Shorthorn. Her dam was a blue-grey got by the roan bull "Regulator" out of a pure Polled Angus cow, but "Regulator" had a dash of white in the roan.

It has been pointed out that a black first cross between a **Galloway bull** and a red Shorthorn cow strongly resembles in appearance and also in feeding qualities the Angus breed of cattle, and, had the origin of the animal not been known, the likeness might have been accepted as strong presumptive evidence of its being due to this cross. The Galloway bull is on the whole more impressive than the Aberdeen-Angus, the breed being more ancient in its origin and the cross-bred stock with the pure Shorthorn more uniform in size and of better colours—commanding a readier market in districts where both are known. There is much less uncertainty about a blue-grey entirely free from horns than about a black first-cross Aberdeen-Angus that is not so attractive in colour, and may develop horns or scurs, and may easily be mistaken for an inferior type of cross. From the Aberdeen-Angus Shorthorn cross one has the chance of getting a greater number of exceptionally good show animals, still there are, all over, more of the narrow-hipped sort among them than among Galloway crosses, and they do not possess such well-developed coats of hair to withstand exposure in a humid country like the south-west of Scotland. But the best are unsurpassed as butchers' beasts to be quickly fed in favourable surroundings into beef of the finest quality.

The first volume of the *Polled Herd Book* was published in 1862, and the second in 1872. After the publication of the fourth volume the Galloway portion was withdrawn, to be published separately. **The Aberdeen Cattle Society**, Aberdeen, which was established in 1879, has since its formation superintended the registration of the Aberdeen-Angus breed. The **English Aberdeen-Angus Cattle Association**, which publishes no *Herd Book*, was formed in May 1900, mainly with the object of holding an annual show and sale at a convenient centre for English breeders and buyers; but also to promote generally the interests of the breed, to hold discussions and give breed prizes at the shows of the Royal Agricultural; Bath and West; Yorkshire; and Royal Counties Societies; and champion medals at the shows of various local societies. An Annual Spring Show and sale of young bulls and other cattle is held under the auspices of the Association at Birmingham, and in 1906 an Autumn Show and sale of cows and heifers was instituted at the same centre.

The following is a list of **leading breeders** in Scotland, followed by **superior herds** in England and Ireland:—

His Majesty the King, Balmoral; the Earl of Airlie, Cortachy Castle, Kirriemuir, Forfarshire; William Shaw Adamson, of Careston, Careston Castle, Brechin, Forfarshire; David Arnot, Mains of Edzell; James Beddie, Banks, Strichen, Aberdeenshire; George Cran, Morlich, Towie, Glenkindie, Aberdeenshire; Garden A. Duff, of Hatton, Hatton Castle, Turriff, Aberdeenshire; Sir John R. Findlay, Aberlour House, Aberlour, Banffshire; J. D. Fletcher, Rosehaugh, Ross-shire; Sir George Macpherson Grant, Bart., of Ballindalloch, The Castle, Ballindalloch, Banffshire; Peter Grant, Advie Mains; James Kennedy, Doonholm, Ayr, N.B.; J. E. Kerr, of Harviestoun, Dollar; W. Gilchrist MacBeth, Dunira, Comrie, Perth; W. G. Macpherson, Mulben, Keith, Banffshire; J. M. L. Marshall of Bleaton, Blairgowrie; Rep. of late Charles Penny of Skillymarno, Strichen; John Philip, Dandaleith, Craigellachie; A. T. Reid, of Auchterarder, Perthshire; P. D. Robertson, Castlecraig, Nigg, Ross-shire; the Earl of Rosebery, K.T., Dalmeny; the Earl of Strathmore and Kinghorne, Glamis Castle, Forfarshire; Robert W. Walker, Portlethen, Aberdeen; Archibald Whyte, Inverquharity, Kirriemuir; James Whyte, Hayston, Glamis; William Wilson, Coynachie and Drumfergue, Gartly, Aberdeenshire; Walter Wilson, Inchgower, Buckie.

Major Alexander, Milford, Co. Carlow; Lord Allendale, Bywell, Stocksfield-on-Tyne; the Earl of Bessborough, Piltown, Co. Kilkenny; H. L. C. Brassey, Apethorpe, Peterborough, Northants; John H. Bridges, Langshott, Horley, Surrey; Sir George A. Cooper, Bart., Hursley Park, Hursley, Hants; J. J. Cridlan, The Home Farm, Maisemore Park, Gloucester; Capt. Greer, Curragh Grange, The Curragh; F. J. B. Gubbins, Kilfrush, Co. Limerick; Lord Lee of Fareham, Chequers Court, Bucks; Major Morrison of Basildon, Reading; E. J. Beaumont Nesbitt, Tubberdaly, Edenderry, King's County; Gerald More O'Ferrall, Firmount, Edgemorthstown; the Earl of Ossory, Dunmore Park, Kilkenny; Lord Penrhyn, Wicken Park, Bucks; the Duke of Richmond and Gordon, K.G., Goodwood, Chichester; Rep. of late Frederick J. Robb, Lisnabreeny, Belfast; Walter A. Sandeman, Morden House, Royston, Herts; Capt. C. T. Scott, Buckland, Worcester; E. G. Wheler-Galton, Claverdon Leys, Warwick; R. C. Williams, Coolcower, Macroom, Co. Cork.

AVERAGE PRICES AT AUCTION SALES OF ABERDEEN-ANGUS CATTLE IN SCOTLAND, Thirty-nine Years, 1882-1921, from *The Banffshire Journal.*

Year.	No. Sold.	Average Price per Head.	Year.	No. Sold.	Average Price per Head.
1882	434	£55 13 10	1902	1578	£25 10 0
1883	265	46 11 1	1903	1435	25 4 4
1884	782	36 3 4	1904	1435	21 17 1
1885	939	24 16 1	1905	1419	22 12 11
1886	814	24 15 5	1906	1162	22 3 0
1887	849	17 1 10	1907	1367	22 11 2
1888	987	20 8 10	1908	1141	22 7 5
1889	1173	21 5 4	1909	1213	25 8 11
1890	1155	22 9 3	1910	1364	24 17 2
1891	862	26 15 10	1911	1406	24 1 6
1892	1013	22 13 8	1912	1303	27 12 8
1893	1423	20 15 1	1913	1561	28 4 7
1894	1168	21 5 3	1914	1512	29 6 11
1895	1052	19 17 7	1915	1613	30 2 1
1896	1185	22 14 0	1916	1406	35 5 10
1897	876	25 6 11	1917	1542	48 13 10
1898	1061	23 10 10	1918	1611	55 1 6
1899	1083	27 4 9	1919	1746	62 10 4
1900	1168	23 15 11	1920	2073	82 16 9
1901	1282	24 12 8	1921	2076	65 8 3

The Aberdeen-Angus Red Poll is a pure strain of the Northern Scotch Polls derived from red specimens that have appeared from time to time among the best Black Polled herds. A. W. Howison, Lochbank, Blairgowrie, still (1922) owns a herd.

This sub-section of the breed was collected by W. K. MacDonald, Windmill House, Arbroath, N.B., whose herd numbered about forty animals. He began by purchasing from George Wilkin "Waterside Elena 2nd"—whose dam was champion heifer at Birmingham Fat Stock Show, first prize cow at the Highland Society's Show at Dundee, and first at the Royal Northern Show at Aberdeen. With this foundation cow and her progeny some half a dozen other red cattle of the best strains of blood in Scotland were mated. The females kept easily up to the level in quality of well-bred herds; but the difficulty in dealing with such a limited number of cattle in this as in other breeds is to find a stock bull good enough to mate with them. Resort was had to a black bull, who usually gets red calves. The red colour being more in favour than the black in the River Plate countries, an offshoot of the Windmill House herd, seen by the Author in 1903, was established in Argentina by Knight and Porteous, at Las Tres Lagunas. The cattle proved to be hardy, and the bullocks feed to 1500 lb. live-weight. This red herd now at Bonifacio, far south on the F. C. Sud. (Southern Railway), numbers about 150 females inscribed in the *Herd*

Book and 1000 Red Polled Mestiza cows, mostly so well bred as to be indistinguishable from the pure-breds, having become pure by crossing. The difficulty about bulls has been overcome by the importation of good red specimens which occurred in the herds at Preston Bissett, Maismore and Fasque, and an Argentine bred bull from Ballindalloch stock. Interesting breeding results have been demonstrated on a large scale in this herd. Red parents on both sides invariably produce red progeny. Black heifers got by a black bull out of red dams produce by a red bull progeny that conform in colour pretty closely to Mendelian proportions. Black heifers out of red pedigree cows put to a red bull throw a large proportion of red calves, probably about 50 per cent. A black cow bred in this way has been known to drop a red and a black calf as twins, and occasionally brindled colours appear. Brindled cows throw red calves with a red bull, but the result of using a brindle bull has not been tested. The colour is nearly always a good brick red, and lighter colours are not liked. Young bulls from Mestiza cows, a very useful type of cattle for producing beef, sell at good prices and give satisfactory results with ranch stock of the Shorthorn type, or other well-bred cattle. Steered cattle command excellent prices. One lot of 140 round three years old, but a few of them less, averaged 892·5 lb. clean meat at the freezing works. Ten-month steer calves now fetch more than finished three-year-olds about 1910.

The success of the Red Polled variety was fostered by the original prejudice in the Argentine against black cattle of any breed, and especially against Black Polled "mocho" or "dodded" cattle, erroneously, and most probably dishonestly, described as "Polled Angus," having been bred from wild black "criolla" cows by "the worst kind of scrub Red Polled bulls in existence." The fact that in 1919 it was officially reported that Argentina possessed 2000 head of pedigree cows and over 300,000 grades indicates how completely and quickly the sentiment in favour of the Polled Angus breed has changed within a decade. What the next ten years may bring forth may be conjectured from a remark in the Buenos Aires *Standard* in October 1918, in favour of the popularity of the Northern Black Polls:—"Since the great 'seca' (drought) of 1916 there has been more demand for Blacks, as people find that they are more 'sufrido' (resistant to hardships) and that it is better to have Polled Angus alive than Shorthorns' hides to sell!"

A report received from Argentina in February 1922 said "that the only time till the Show of 1921 that an Aberdeen-Angus steer was awarded the Championship at the Palermo Fat Stock Show was in 1911. It was anything but popular, whereas the awards made at the last show were most popular. The Argentine estanciero has lost his prejudice against the

Aberdeen-Angus, and is beginning to understand their outstanding merits from a beef point of view. The formation of, and propaganda made by, the 'Asociacion Argentine Criadores de Aberdeen-Angus,' and latterly by the 'Sociedad Criadores de Aberdeen-Angus,' formed in 1920 by the most influential Aberdeen-Angus breeders, have made the breed well and favourably known, and to-day there are a large number of new breeders, and Aberdeen-Angus bulls at present are in greater demand than Shorthorns."

The Galloway is one of the oldest, hardiest, and most characteristic of all British breeds of cattle—so old, that, with the exception of the wild park cattle, no trace is left of the breed or breeds which contributed to its formation. It derives its name from a district in the south-west of Scotland, comprising Wigtownshire and the Stewartry of Kirkcudbright. At one time Galloway extended to nearly the whole area of the six south-western counties, being bounded on the north-east by an imaginary line drawn between Glasgow and Carlisle; and the Galloway was the most prevalent breed in Scotland west of the Tweed and south of the Forth and Clyde till the first decade of the nineteenth century. Wilson's *Record of Kirkbean* says of the **cattle of Dumfries** in 1811, that "the cows for breeding are principally of the Galloway kind. The young two-year-old bullocks kept for grazing are one-half Galloway, and the other half West Highland, bought at Falkirk Tryst in October; and after being fed one year, they are sold to drovers to be forwarded to the English markets."

Distinctive Characteristics.—Though Galloways are now polled and of a black colour, with a brownish tinge on the tips of the hair, particularly at that stage when it is long and inclined to be somewhat woolly, yet, Youatt says, as late as the middle of the eighteenth century, many animals of pure blood had horns of considerable length, and not a few were red-brown in colour. It is now thought that the cattle referred to were not pure bred; probably Highland crosses brought from Falkirk Trysts, for pure-bred Galloways never have either horns or scurs and the red-brown colour is very rare. White patches on the udder and belly or thigh, also belted markings, or a white hind foot, are uncommon, but when they are present they are seriously objected to by home breeders and for export purposes. This tendency to revert to white, which is most pronounced when two animals of very distinct types are mated together, indicates the descent from the ancient wild cattle, a condition similar to that already pointed out in the case of other breeds. Some tribes show white hairs in their tails, and a good many have white hairs through their coats, like West Highlanders. Dun is an unrecognised colour of the breed, still persistent in a few families—especially in tribes hailing from farms in Mochrum and Kirkcowan districts. John M'Kie of Ernespie owned

(1905), a very fine dun cow with twin dun heifer calves at foot and all her calves, with one exception, were dun by black sires. Wm. M'Connell, Glasnick, Kirkcowan, kept a pure family of duns that most frequently bore dun calves to a black bull. Duns of superior quality still exist in other herds of the best cattle. A beautiful dun yearling heifer from Chapleton won the Championship at the Scottish National and Smithfield Shows as a two-year-old in 1906. The latter herd once contained a black cow with a grey stripe from the chin down each side of the dewlap till they united on the breast, a marking akin to that of the Polled Angus grey-breast family. This marking is of a different class from a natural swirl of reversed hair, which springs on patches like the hair on a cow-lick. Almost extinct characteristics were a tan-coloured ridge along the back, a tan ring round the muzzle, and tan ears.

"There is no race of cattle in which the importance of a good head is more generally or more strongly recognised than in the Galloway." The head should be wide and short —a long head being one of the prominent characters by which a Galloway cross can be distinguished from a pure-bred animal; the distance from the eye to the wide nostril short; the forehead broad and square between the eyes, carrying the width well up to the crown, which should be low and rounded, not peaked like the crown of the Polled Angus. The ear, resting on a short shank, is set on rather farther back than in most breeds, and should point upward and forward. The lobe or flap should be wide, rounded at the top, and abundantly fringed with long hair. The skin is comparatively thick and heavy on the scales, but mellow to the touch, and covered with a profusion of long, silky, and wavy hair with a mossy undercoat well described as "a coat and vest." Wiry or curly hair is very objectionable. The flesh at Smithfield ranks as "prime Scots"—marbled beef well distributed over the frame and down to the knees and hocks. Rounded buttocks, like a hog's, are most objectionable.

Points to be Avoided in Galloways.

As prepared for the American Galloway Breeders' Association, by the late James Biggar, The Grange, Dalbeattie, Scotland, Judge of Fat Classes at the International Show, Chicago.

1st. Long narrow head, with light crown. 2nd. Narrow tapering muzzle. 3rd. Long drooping ears. 4th. Small deep-set eyes. 5th. Small light neck. 6th. Light scraggy breast. 7th. High narrow shoulders. 8th. Flatness behind shoulders. 9th. Light fore or back ribs. 10th. Square and prominent hook-bones. 11th. High or drooping rump. 12th. Weak or slack loins. 13th. Rounded buttocks. 14th. Fleshy double thighs. 15th. Big coarse bones. 16th. Thick stiff skin. 17th. Hard wiry hair without soft undercoat.

By the present rules of the Galloway Cattle Society, only black and dun coloured, but not "belted" Galloways are eligible for entry in the *Herd Book*.—Duns were readmitted in 1921.

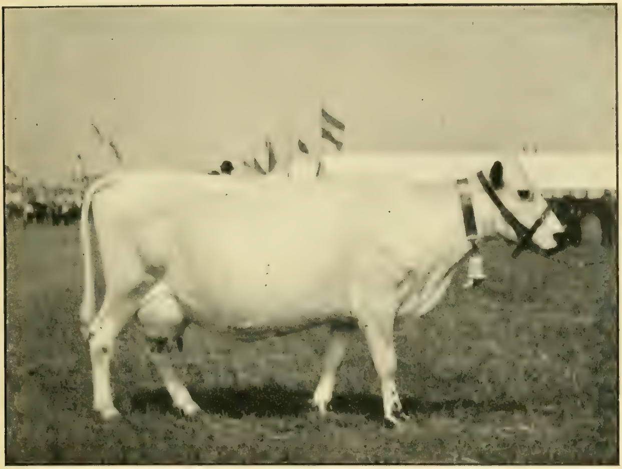
The origin of the Polled condition is veiled in doubt. It may be said that the early written history does not even speculate upon its cause. It is known that this characteristic was preferred by the English buyers who, since a time soon after the Union of the Crowns of England and Scotland in 1603, have carried four- or five-year-old bullocks of the Galloway breed to finish in the rich pastures of Leicester and Northampton, the salt marshes of Cambridge, and the adjoining counties, especially Norfolk and Suffolk. Apart from the superior quality of the breed, which is admitted, the injury which half-wild cattle with horns were capable of inflicting upon one another, and possibly upon the men in charge of them, during a walk of some hundreds of miles, seems to be a sufficient excuse for the preference of the southern drovers for hornless animals, for which, indeed, a higher price was given.

The Galloway and the West Highland breeds are universally considered to be **descended** from the same original stock; but although in type of body they are much alike, there are no sufficient historical grounds for the belief. The former are said to be "Highlanders without the horns." This, if true, would associate them directly with the wild forest cattle. West Highland crosses by a Galloway bull have been put with pure-bred Galloways, and the best judges of Galloway cattle have been unable to distinguish the crosses from the pure specimens. As already noted, the Highland cross, the other way, is easily distinguished by the colour and coarse quality of its hair, showing that there is a greater difference between the pure breeds referred to than is usually supposed.

Galloway bulls possess great power of stamping certain characters upon their crossed descendants. With a cow of any British breed, with the exception of the Shorthorn, the offspring is almost invariably black, and "with cows of different horned breeds, almost without exception, the offspring is polled." James Little, Tower of Sark, put a Galloway bull to a good herd of Cumberland (non-pedigree) Shorthorn cows. The produce were all hornless and blue-grey, but some of them had white patches. The following year an Angus bull was used, but the results were not nearly so uniform. Some were roan and several had horns. The difference may be fairly attributed to the different characteristics of the Black Polled breeds; although the greater prepotency of one bull, and also the fact that second crosses even by the same parents are at times more variable in colour than first crosses, might at times claim a share of the influence at work.

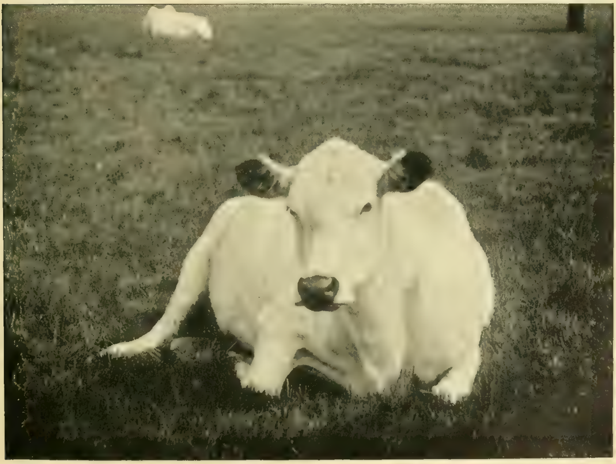
The breed did not acquire this special prepotency (which had been quaintly referred to in Scotch as "uncanny"), as improved cattle have usually done, by close-breeding on both the male and the female sides. Close-breeding has been limited, and practised only in recent years, as may be gathered from their wonderful hardiness of constitution and also from their being, under natural home conditions, rather slower than most breeds in coming to maturity. Still, under forced feeding of the modified type to which they have at times been subjected, the great wealth of constitution enables them to stand the pressure, and to rank well at moderate cost with early maturity breeds.

No outstanding so-called "improver" ever rose to do work like that of the Collings upon the Galloway breed. But the work was well done under the fostering care of the noblemen and gentlemen of Galloway, towards the end of the eighteenth and early in the nineteenth century. Besides the family of the Earl of Selkirk, and those of Lord Daer and the Earl of Galloway, there were the Murrays, Herons, Gordons, Maxwells, Maitlands, M'Dowalls, Cathcarts, Hawthorns, and Stewarts. The old breeders knew well that to attempt to improve Galloways on the lines adopted by Shorthorn men, to increase their size and lessen the period spent in coming to maturity by close-breeding, meant ruin to the constitution of the breed in the matter of withstanding the cold and inclement weather to which they are exposed under natural conditions in their native district. It is impossible to obtain excellence in regard to rapid maturity by the usual course of in-and-in breeding, and retain the hardihood necessary in mountain cattle. This country already possesses an abundance of breeds that fatten quickly, and it would be a misfortune if a breed of animals that, with open-air quarters both summer and winter, now produces the finest quality of beef, on natural home-grown, inexpensive food, frequently under adverse climatic surroundings, were thoughtlessly and ignorantly sacrificed in the rush for early maturity. We have not yet seen the final results of the system of in-and-in breeding which has been going on more or less closely for a hundred years; but the time may come when it will be necessary to go back to such breeds as the Galloway to recruit the ebbing strength of some of the greatest sufferers from the consequences of the practice. Tuberculosis, which is both prevalent and on the increase in



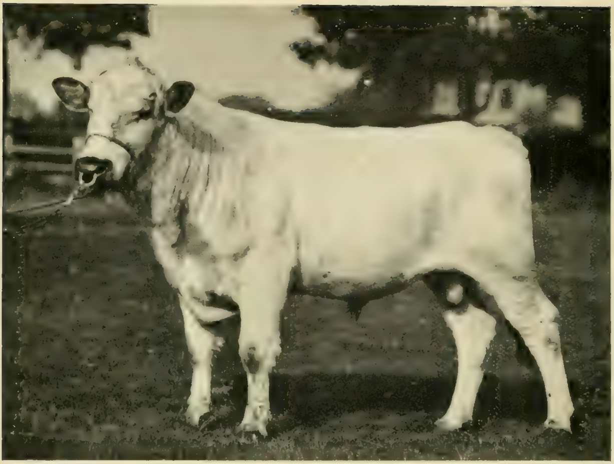
A. Fjall Cow.

An Ancient Swedish Breed of White Polled Cattle with black points.

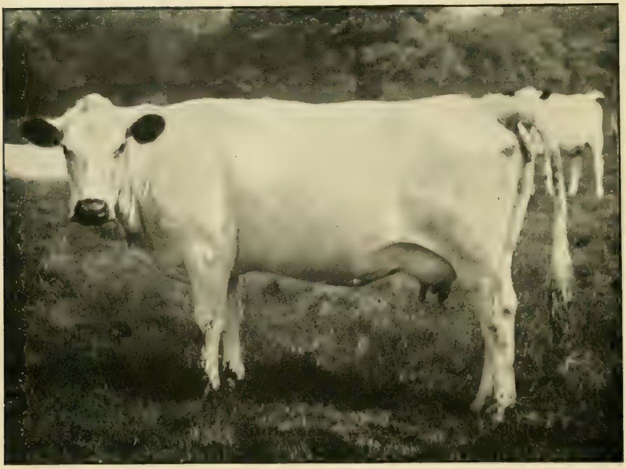


B. Somerford Park White Polled Cows at Rest.

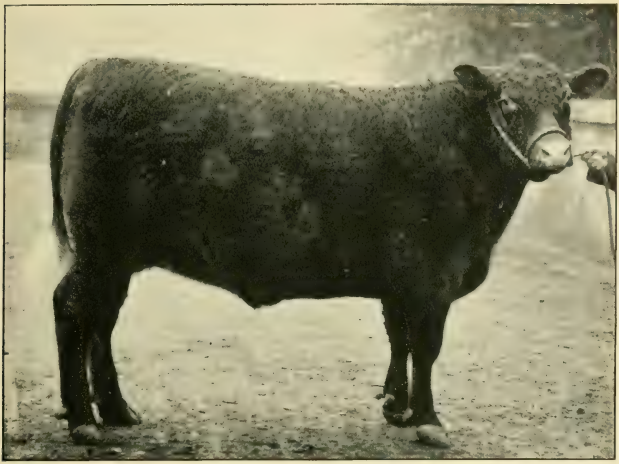
[*G. H. Parsons, Alsager, Cheshire.*



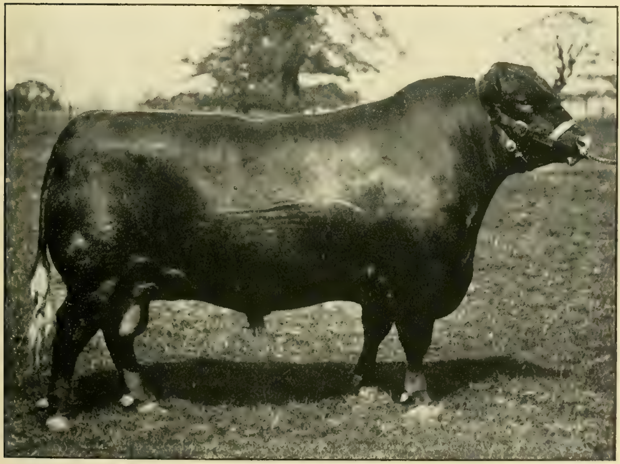
A. White Park Bull, "Bandeswell Thunderer."
Owned by Major Quinton, Guernsey.
[*"Agricultural Gazette Photograph.*



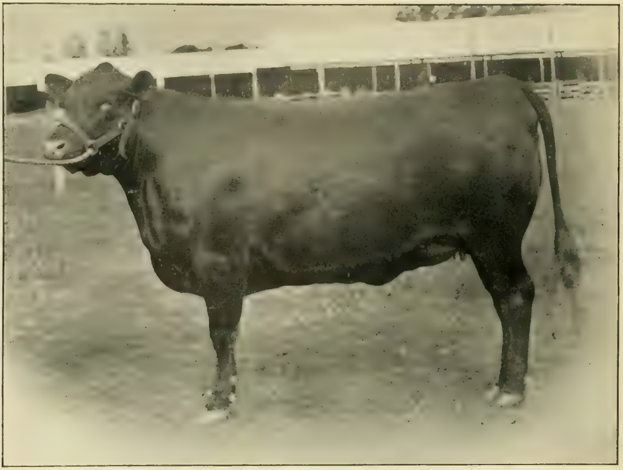
B. Somerford Park White Polled Cows.
[*G. H. Parsons, Alsager, Cheshire.*



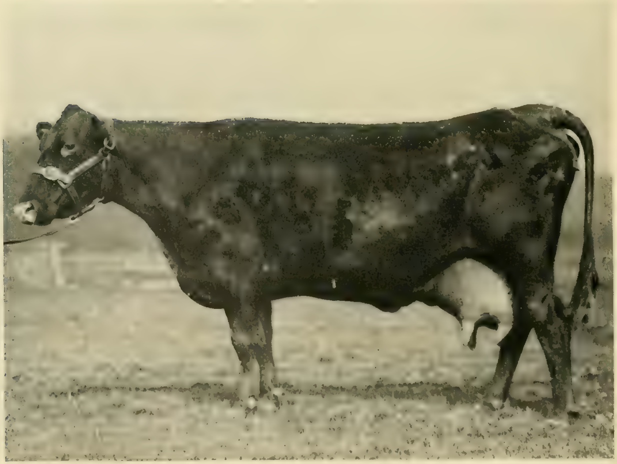
A. Red Poll Steer, "Acton Comet," sire "Logan.
First and Breed Cup at Smithfield, 1904, etc. etc.
Bred by Sir W. O. Corbet, Bart., Acton Reynold, Shrewsbury.



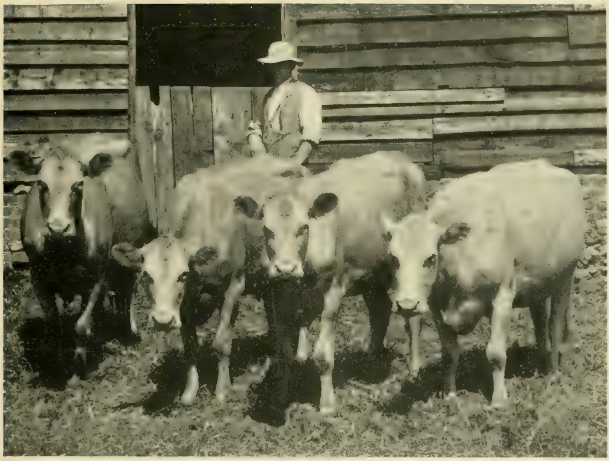
B. Red Poll Bull, "Albert."
Many 1st prizes, including the English Royal in 1904.
Bred by Hon. A. E. Fellows, and owned by Sir W. O. Corbet, Bart.
[Both by G. H. Parsons, Alsager, Cheshire.



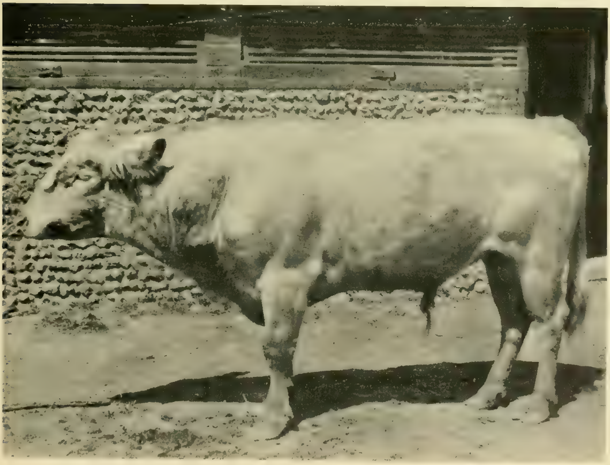
A. Red Poll Heifer ("Davy," 204).
1902 to 1905, won eight Firsts and four Champions, besides other prizes.
Bred and exhibited by John Hammond, Bale, East Dereham, Norfolk.
[*W. L. Shrubsole, Norwich.*



B. Red Poll Cow, "Gressenhall Molly." Born 1912.
Owned by the late Lord Manton. Champion in the milking trials at Derby Royal.
[*"Agricultural Gazette Photograph."*

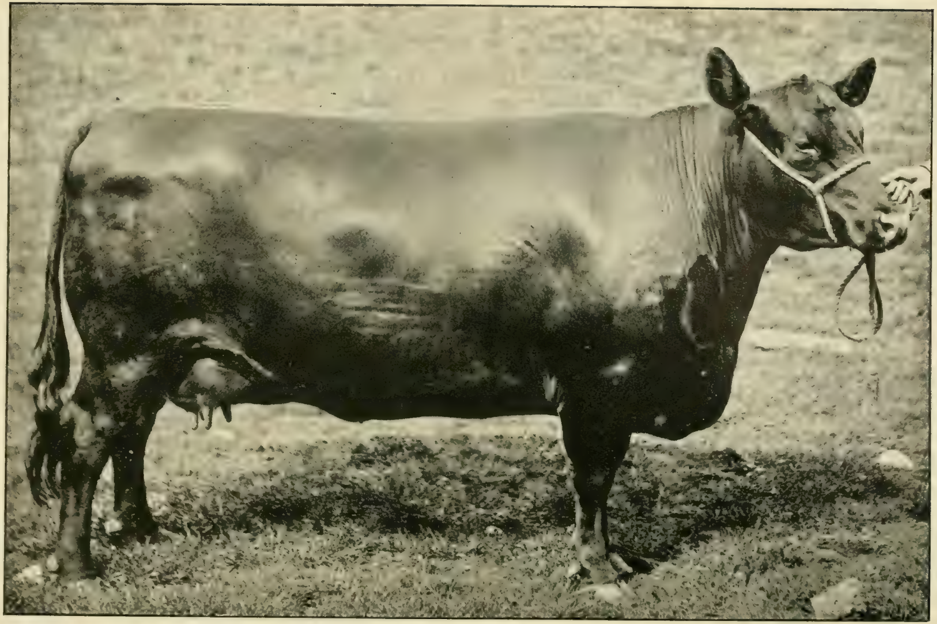


A. Suffolk Golden Dun Polled Cows (Extinct) at Old Backenhem Hall, Norfolk. The property of Prince F. Duleep Singh, 1900.



B. Suffolk Golden Dun Polled Bull (Extinct), "Sir Riddlesworth." The property of Prince Duleep Singh, 1900.

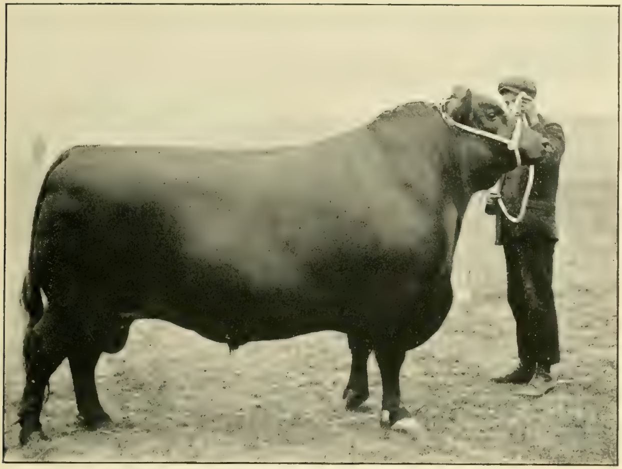
PLATE LIV.



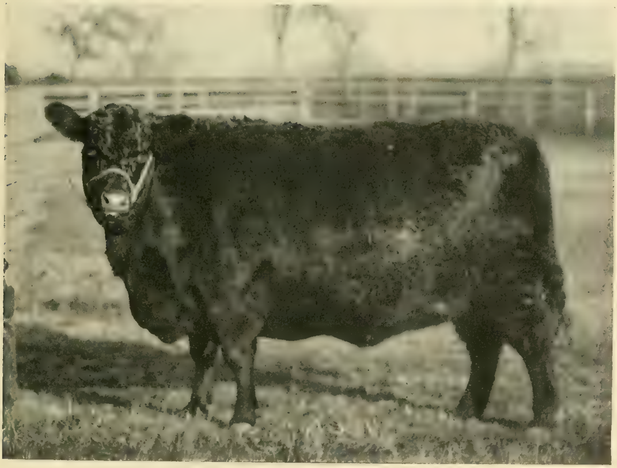
Aberdeen-Angus Black Polled Heifer, "Legend."

Bred by Colonel George Smith Grant, Auchorachan, Glenlivet.

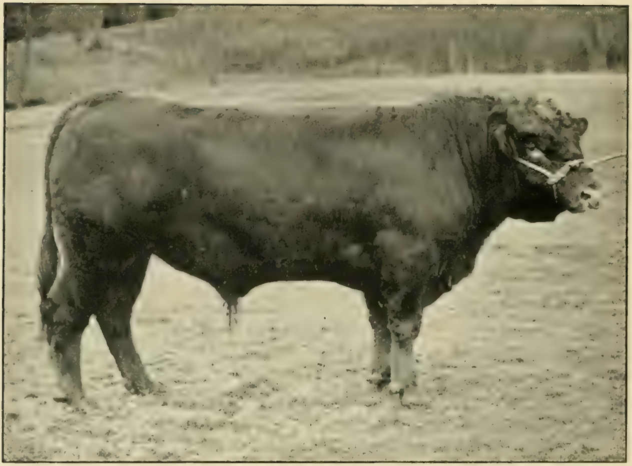
[*Robt. Stewart, Elgin, N.B.*



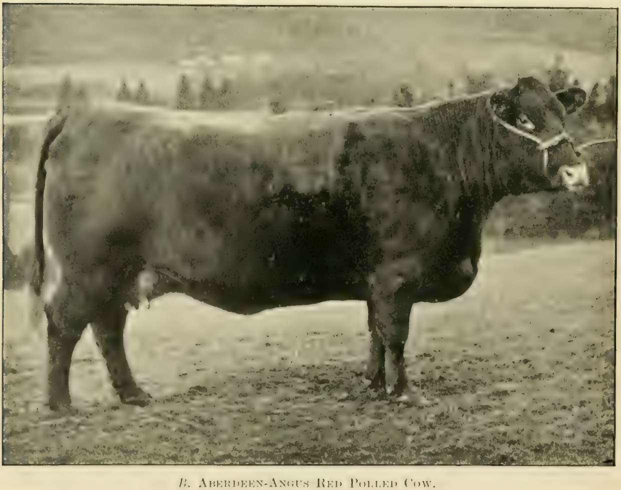
A. ABERDEEN-ANGUS BLACK POLLED BULL, "WIZARD OF MAISMORE."
Winner of First and Champion at many Shows.
Owned by J. J. Cridland, Maismore Park, Gloucester.
[*G. H. Parsons, Alsager, Cheshire.*



B. ABERDEEN-ANGUS BLACK POLLED HEIFER, "ZU ZU OF GLAMIS."
Champion at Smithfield and Birmingham, 1898.
[*W. Mayor, Forfar and Kirriemuir.*

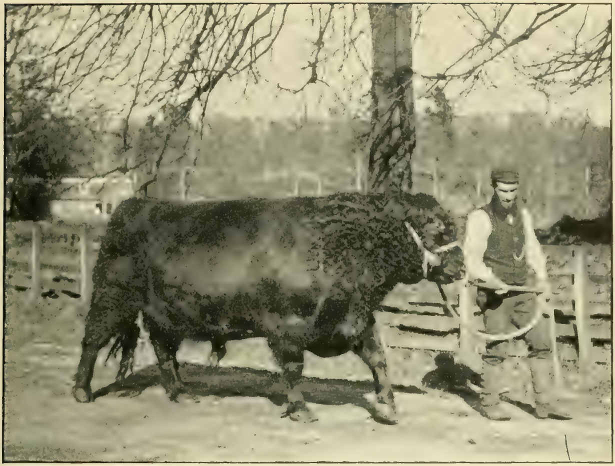


A. Aberdeen-Angus Red Polled Bull.

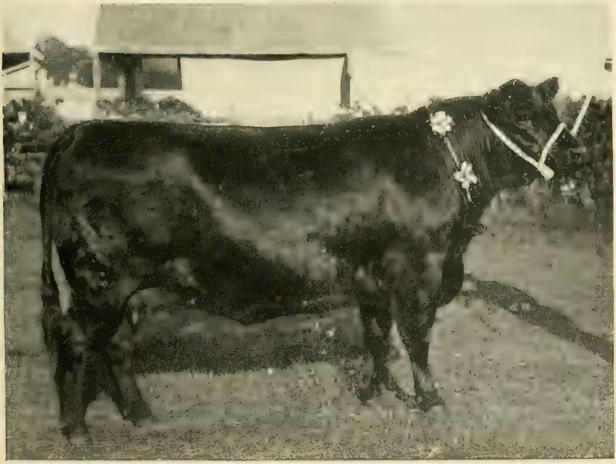


B. Aberdeen-Angus Red Polled Cow.
Both bred and owned by W. K. Macdonald, Windmill House, Arbroath, Scotland, at Ballintinne, near Blairgowrie.

[*Both by C. Reid, Wishaw.*

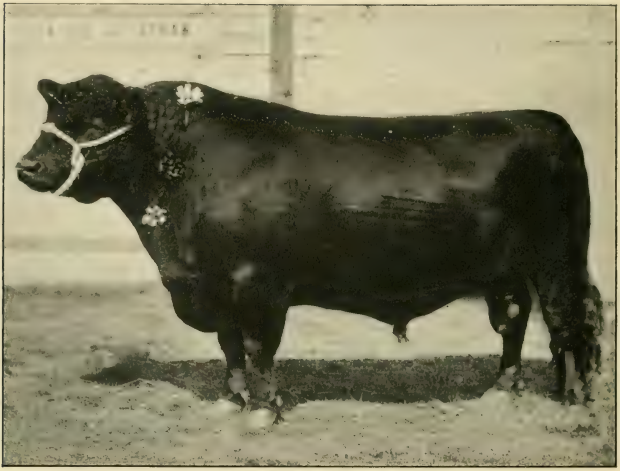


A. Galloway Black Polled Bull.
Bred by His Grace the Duke of Buccleuch at Drumlanrig.
[*J. Fingland, Thornhill.*

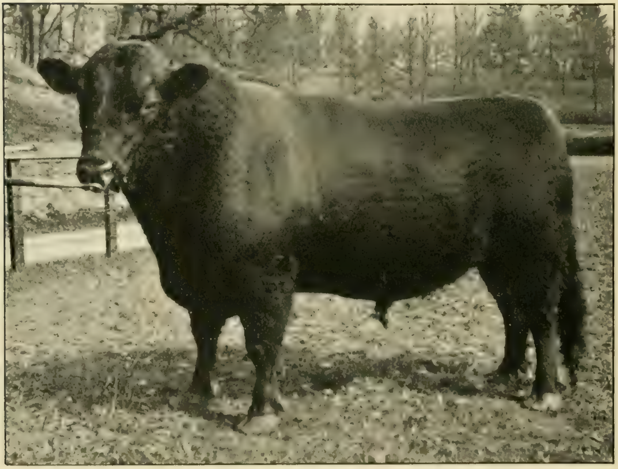


B. Galloway Cow, "Tarbreoch Blue Bell 3rd."
Champion at Dumfries Highland Show, 1922.
[*C. Reid, Wishaw.*

PLATE LVIII.

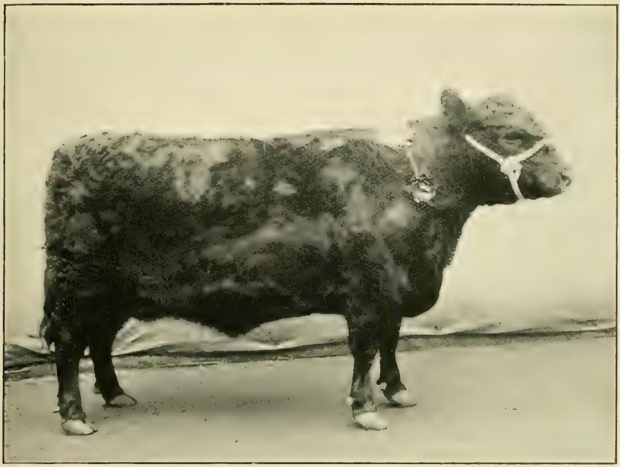


A. Galloway Bull, "Tarbreoch Cæsar" (13065). 5 years and 6 months.
President's Medal at the Stirling Highland Show, 1921.
Bred by John Cunningham, Tarbreoch, Dalbeattie. Owned by W. Betts Donaldson.

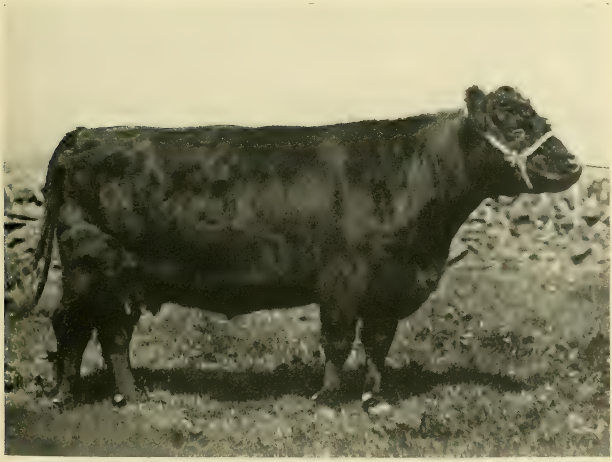


B. Galloway Bull, "Black Prince of Drumlanrig."
Perhaps the most famous of the great sires of the breed.

[*T. Douglas, Thornhill.*

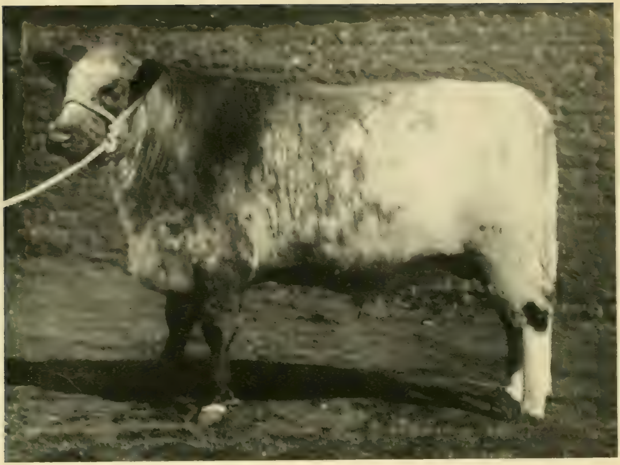


A. Galloway Heifer, "Lady Grace."
First and Breed Champion, Smithfield, 1904.
Bred by Thos. Biggar & Sons, Chapelton, Dalbeattie.

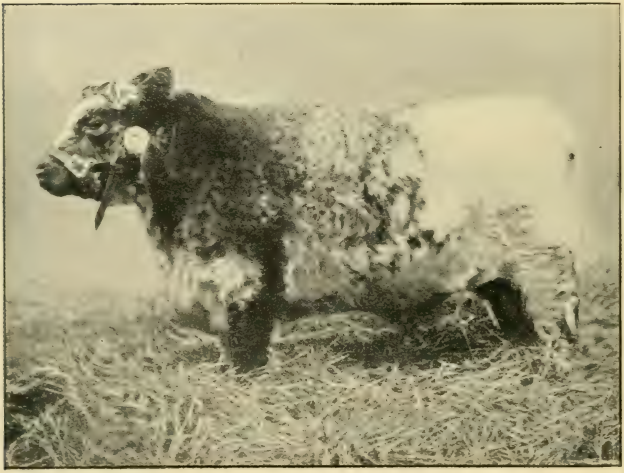


B. Galloway Cow, "Maggie Lauder 7th.'
Owned by J. W. Cunningham, Tarbreoch.
[*"Agricultural Gazette Photograph.*

PLATE LX.



A. Blue-Grey Roan Steer, "General," in 1896.



B. Blue-Grey Roan, "General.
Champion Steer at Norwich, Birmingham, and Sheffield in 1897.

some breeds, is one of the signs that should warn breeders of the peril of a heedless course of in-and-in breeding. The disease is almost unknown among Galloway cattle, there being not more than one or two doubtful cases on record.

As dairy cattle Galloway cows are not noted. The calves are generally allowed to follow their mothers. The quality of the milk is excellent, but the quantity, as a rule, is deficient. Individual instances of cows giving large quantities of milk occur, but as a breed they have never been managed like dairy cattle.

The increase in the feeding of cross-bred and half-bred sheep, and the remarkable extension of dairying during the latter half of the nineteenth century, have brought about a great diminution in the numbers of this breed, and a concurrent increase in the deeper milking Ayrshire. It is asserted, too, that in spite of increased attention during that period, the best animals of the present day have only in comparatively recent years begun to show improvement on those of earlier times.

The establishment of a Galloway "Herd Book" in 1877[1] gave an impetus in the direction of improvement, and the qualities of the breed for ranching purposes in the Canadian North-West and in the United States, with Kansas, Iowa, and Illinois as the centre, are fully realised. The most recent exportations have been repeat orders to the Argentine and South Africa.

A cross-bred from a Galloway cow by a bull of one of the favourite flesh-producing breeds, such as Shorthorn or Hereford, is usually an excellent butchers' animal.[2] The calves produced by a Shorthorn bull, if he be white or light roan, are prevalently **blue-grey** or uniform mealy roan polled, and much more like the Galloway than the Shorthorn. At times the colour is black, and on rare occasions white with black points. Alex. Gordon, of Culllinaw, Castle Douglas, has bred a considerable number of white crosses with black points by a white Shorthorn bull from grey cows possessing very little cross blood, and on one occasion from a pure Galloway cow.

A strawberry roan or a red bull gets more black crosses than blue-greys. So important is the matter of colour and so superior the blue-grey as a market quality, that white Shorthorn bulls are being systematically bred, to supply breeders of blue-greys from Galloway dams in the North of England, from two white parents, to emphasise the white tendency (see p. 13).

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[1] The first editor was the Very Rev. John Gillespie, LL.D., Mouswald Manse, Dumfriesshire, who was also the writer of "The Galloway Breed of Cattle" in the *Transactions of the Highland and Agricultural Society* for 1878, and of "Famous Galloways" in vol. xxiii., 1901, as well as annual notices in the *Live Stock Journal Almanac*.

[2] The champion ox, exhibited by Sir John Swinburne, at the Smithfield Club Show, 1892, was a light blue-grey Galloway Shorthorn,—weight 2070 lb. at 1050 days, daily gain from birth 1.82 lb.

White cattle with black noses, a few black hairs about the ear, and the dark Galloway eye, are common in the Galloway cattle district of Northumberland. They are mostly the result of a second cross, a Shorthorn bull on a blue-grey heifer, although this marking sometimes occurs in the first cross. "General" (Plate LX.), the blue-grey bullock which in 1897 was Champion at Norwich, Birmingham, and Smithfield, was by a Galloway bull out of a white Shorthorn cow.

During five years from September 1900, **J. Shields, at Dolphingstone**, Tranent, made an excellent record with an annual purchase of about fifty mixed market heifers rising two years old, selected for breeding cross calves to a white Shorthorn bull. The sires of the breeding heifers were Galloway bulls, but their dams included Ayrshires, cross-bred dairy cows, non-pedigree Galloways, and a few animals entered in the *Galloway Herd Book*. After being wintered out-of-doors, and put to the bull about the end of March, the heifers continued at pasture and caused no expense for artificial food till the calves began to drop about Christmas. They then got the shelter of an airy cattle court, and were fed on sliced turnips, mixed meal and straw; and each calf followed its mother. When a year old, four-fifths of the calves weighed about 7 cwts. each. Those that were good enough for show purposes were kept going forward with a liberal supply of linseed and other cakes, amounting to as much as 3 or 4 lb. per day. Symmetrical, kindly-feeding animals under eighteen months, were fit to put in training for showing, and when not good enough to exhibit they went to the butcher before they were two years old. At from twenty to twenty-four months, these latter made top market prices. When fed with their dams during summer grazing, the show animals developed very rapidly. The dams were fat generally about Christmas. One steer shown at the Scottish National Show, Edinburgh, in 1905, by an Angus bull out of a blue-grey heifer, weighed 12 cwts. 2 qrs. at one year and seven months; and another of the same age of the Galloway-Shorthorn cross weighed 13 cwts. At the same Show in 1903 one of the steers under two years, fed by Lord Rosebery, was fourth in his class, and third at Smithfield a few days later. At the same time two bullocks fed at Dolphingstone were first as a pair of butchers' cattle under 13 cwts. at the Scottish National. One of the heifers under 11 cwts., fed by Peter Dunn, gained third prize at Birmingham, second at York, and first at Leeds, in 1905.

In the carcase classes at Smithfield Show, Galloway entries have not been numerous, but, besides winning the Championship of the whole section, they have won several firsts, and, numbers considered, more than their share of other placings.

"Since the inauguration of the Scottish National Fat Stock Club, Galloways or their crosses have been regularly exhibited from Sir Robert Jardine's famous herd at Castlemilk in the butchers' classes—open to cattle of any breed. On only one occasion has he failed to supply the winners or seconds."

The Irish Department of Agriculture has been a steady buyer of Galloway bulls for many years, and these bulls have been placed at suitable centres in the north and west of Ireland for the use of the crofters and smaller farmers. The late John Drennan, farmer and cattle-feeder near Londonderry, stated that "nothing the Department of Agriculture had done for crofters on poor land of the wet, stormy north-west had been more helpful than the introduction of premium bulls of this breed." William Dunlop of Dunure Mains, Ayr, who made interesting experiments in the breeding of feeding cattle in Ireland, stated that, on land of the first grade, cattle of the Angus cross, Shorthorns, Herefords, etc., will make rather heavier weights at the same age, but on any other land the Galloway crosses cannot be equalled, and that they can be fed to profit at from 18 to 20 months, and are not slow feeders as some desire to make out.

Many grand cows breed regularly far into their teens, and a large proportion of the show bulls are prolific years after most of their contemporaries have passed to the butcher.

Under the auspices of the **Galloway Cattle Sales Association** an important Show and sale of pedigree bulls and heifers is held annually towards the end of February in Castle-Douglas. The management is in the hands of a representative committee of breeders of registered Galloway cattle, and the Secretaries are Hewats & Dunn, Solicitors, Castle-Douglas. The organisation was formed about the middle of last century, and sales have been held annually, without interruption.

Hereford crosses by Galloway bulls are also polled, with white heads and black bodies. The progeny of a Galloway bull on cows of slow maturity breeds are usually tardy or inferior, being often thinly built like their dams. Galloway crosses from Ayrshire cows are mostly black, but slow and unsatisfactory feeding animals while young, though when more than three years old and under good treatment they develop into excellent light-weight butchers' beasts at the finish, and the cows are fair milkers.

Carlisle, in the north of England, conveniently situated for the Galloway cattle-breeding area, has naturally assumed, together with Haltwhistle, the position of the **chief market** for Galloway crosses, mostly blue-grey by Shorthorn bulls. Dumfries was for many years the great cattle market of the south of Scotland, and it remained so till into the eighties of the nineteenth century, when, simultaneously with the development of auction marts for store cattle, much of the trade gradually moved to Castle Douglas. From Dumfries alone, droves aggregating 25,000 to 30,000 head started annually on the journey of about three weeks, avoiding turnpikes and following the green lanes or drove-roads which traversed the country from north to south.

We have it on the authority of the late Gilbert Murray, in Coleman's *Cattle of Great Britain*, that, down to about the fourth decade of the nineteenth century, large numbers of horned cattle, having in hair, colour, and general appearance a strong resemblance to Galloways, were bred in Ireland, and shipped when one to two years old to Portpatrick in Wigtownshire—as many as 10,000 in a season. Irish breeders and cattle-dealers removed the horns and scurs with a fine saw to make them look more like Galloways, and then they were bought by graziers who came from long distances to attend the markets at Stranraer, "the great mart for Irish cattle in Scotland." It has been asserted that Galloway cattle became deteriorated by crossing with this inferior Irish breed, but the facts of the case clearly indicate otherwise. Galloway breeders disliked the intruders because of their inferiority and the competition with their own cattle, and it was the practice, also commonly applied to Galloway heifers, to spay the heifers to be fed, either in Ireland or shortly after landing—"the distinguishing mark of a spayed heifer being a triangular piece cut from the top of the right ear"—so that they settled better, and fed faster, and could be grazed along with any other class of cattle. Moreover, there is no indication, in the breeding of Galloway cattle of the present day, of the recent introduction of alien blood.

From a *Brief Account* of the breed by the Very Rev. Dr Gillespie, issued about the opening of this century, we learn that in the early carcase competitions at the London Fat Stock Show the Galloway "carried off the lion's share of the prizes against all other breeds"; and that fat Galloways dressed to 60 per cent. of their live-weight. A heifer thirty-three months old, weighing 1690 lb., yielded 1120 lb., or 66 per cent. of beef. A fair estimate of the **live- and dead-weights** of well-fed cattle is :—

Age.	Live-Weight.	Dead-Weight.
15 months	900 lb.	540 lb.
27 ,,	1400 ,,	840 ,,
39 ,,	1750 ,,	1070 ,,

The **method of feeding** show animals adopted by Thos. Biggar & Sons, of Chapelton, Dalbeattie, N.B., is applied most successfully to the Galloway breed. During seven years at the beginning of the century these breeders won the Breed Championship six times with four steers (that of 1902 being Dun) and two heifers. At the Show of 1904 their Galloway steer, "Shamrock," was reserve champion steer; and some good judges thought he should have held the first place. In 1901 their heifer stood third against all ages and all breeds.

The turnips given in this method vary from 50 to 75 lb. per day according to circumstances, and the rye-grass hay, and chaffed straw averages 12 to 14 lb. The grain, consisting of a mixture of linseed cake, maize, crushed oats, and some bean meal, varies from 8 to 12 lb. The grain and chaff are mixed, and boiling water poured over the mass, which stands from twelve to fifteen hours before being given in three feeds. With two supplies of roots the animals have five feeds a day; and this goes on all the first winter. Meanwhile they go out daily for exercise and to maintain health. In spring they are let out to grass for a couple of weeks to clear out and alter the system. They are then put into well-littered loose boxes for the remainder of the time, so that the amount of food may be under control, and the animals have regular exercise (a walk of about ¾ mile daily), and are trained to be led and to stand so as to show to advantage. The exercise keeps the legs and feet in good order, and stimulates the appetite. The winter grain-rations in moderate quantities are continued during summer, but, in place of hay, straw, and roots, grass, clover, or vetches are substituted, as bulky food, till August, when the final feeding period of high pressure with roots and dry fodder commences. Flesh is then made rapidly. As the show season draws near, the roots and hay are decreased and the grain and cake increased. "Shamrock" received the following rations during the last two months:—Maize meal, 4 lb.; bean meal, 4 lb.; crushed oats, 4 lb.; linseed cake, 2 lb.; cut hay and long hay, 12 lb.; turnips, 40 lb.; a lb. or two of treacle being added daily to make the fodder more attractive. About ½ oz. of crude carbolic acid is given in the food each week to keep the blood in good order. Towards the end of summer the linseed cake is gradually diminished and the bean meal increased, to firm up the flesh.[1]

At the **carcase competition at Smithfield** in 1895, a Galloway bullock from Chapelton weighed at two years and ten months 12 cwts. 3 qrs. 3 lb. alive, and dressed to 8 cwts. 3 qrs. 1 lb., or 68·3 per cent., the record percentage for the year; but he was considered rather fat. At the same competition in 1921 a two-year-old Galloway exhibited by Alfred Palmer, Berkshire, won the Carcase Championship with a live-weight of 9 cwts. 3 qrs. 6 lb.—dressed, 5 cwts. 1 qr. 7 lb., or 55 per cent.

A list of the breeders of a few prominent herds follows[2]:—Thomas Biggar & Sons, Chapelton, Dalbeattie; David Brown, Stepford, Auldgirth; The Duke of Buccleuch, K.G., K.T.,

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[1] Refer to Prof. Kennedy's article in *Wallace's Farmer*, 31st March 1905.

[2] The complete list appears in *The Official Handbook* of the breed, to be had free on application to the Secretary. See List of Live Stock Societies, Appendix A, "Cattle."

Drumlanrig Castle, Thornhill; Robert I. Calwell, Ballyboley, Ballymore, Co. Antrim, Ireland; John Cunningham, Tarbreoch, Dalbeattie; W. B. Donaldson of Auchineden, Blanefield, Stirlingshire; Robert Graham, Auchengassel, Twynholm; Lady Dorothy Henley, Askerton Castle, Brampton, Carlisle; Sir R. Jardine, Bart., of Castlemilk, Lockerbie; J. Murray Kennedy, of Knocknalling, Dalry, Galloway; William M'Conchie, Mains of Penninghame, Newton Stewart; Col. Tottie, Conniston, Cold, Bell Busk, Yorks; James Wilson, Tundergarth Mains, Lockerbie; Arthur Young, of Garroch, Dalry, Galloway.

Sheeted, Belted, or White-middled Galloways form one of the oldest, and, at the same time, one of the most valuable strains of this ancient Scottish breed.[1] **Low** mentions:—

> "The sheeted breed of Somerset, now extinct, which had existed in the same part of England from time immemorial. The red colour of the hair has a light yellow tinge, and the white colour passes like a sheet over the body. 'The head, the neck, the shoulders, and the hind parts appear as if they were uncovered, while there is a sheet fairly and perfectly thrown over the barrel' (Youatt). The cows, sometimes horned, but more frequently hornless, are hardy, docile, and better suited to the dairy than others that have been adopted. The peculiar marking which distinguishes these cattle is not confined to any one breed. It appears among the cattle of Wales when they are crossed by the White Forest Breed, and is frequent among those of Ireland, and used to be amongst the older Galloways of Scotland. It is very common in Holland, where the colours are black and white. It may be ascribed to the intermixture of two races having each a tendency to produce the pristine colour of the stock from which it is derived."

On the authority of the **Rev. Geo. Gilbert**, quoted by **A. D. Euren**:—

> "At one time there were quite a number of sheeted cattle, since dead, out on the Marshlands bordering on Norfolk and Suffolk, which had been there for quite a century. They were brought over from Holland at the time when great numbers of cattle were landed from the Continent at Yarmouth and other places."

The **chief home** of the Belted Galloway for many years was the Haltwhistle district of Tyneside, not their native Galloway, where they declined in numbers (*a*) as a result of the favour conferred on black by the *Herd Book* regulations, directing foreign buyers to pure black skins; (*b*) in consequence of the increased numbers of sheep kept, displacing some of the old pure-bred though not pedigree herds in which white-belted cattle were kept; and (*c*) owing to the uncertainty as to purity after Ayrshire cattle came into the district. Recently a decided change has taken place in favour of their original habitat.

In the rugged and beautiful district around the Glenkens belties were common, strongholds of the breed being Barlae, Strongcastle, and Barskeoch Mains, where the late John M'Turk bred one of the finest belted bulls ever seen. They were also to be found at Corrahill, Balig, and Cannee in the Kirkcudbright district, and at Almorness, Dalbeattie. The oldest inhabitants in Galloway say that there have always been belties in their districts.

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[1] See, at 3 George IV. Bridge, Edinburgh, a painting by Gourlay Steel, R.S.A., of the Belted Ox, exhibited by Patrick Dudgeon, of Cargen, at the Highland Society's Show at Dumfries in 1870.

They were introduced into the north of England about the beginning of last century from the south of Scotland—according to one tradition, from Lady Selkirk's herd, Balmae, Kirkcudbright—by Lady Melville (Lady Jane Hope of Hopetoun), the wife of Lord Wallace of Featherstone Castle, Haltwhistle, who had been previously married to the first Viscount Melville.[1]

This strain of belties were known at one time as Melville Galloways; but they were probably not the first Galloways introduced into Northumberland, since, as Dr Gillespie says, "the same race of cattle (Galloways) have been kept from time immemorial in Cumberland, the (adjoining) most north-westerly county of England." From Featherstone the belties were distributed among the tenantry and became popular, and prizes were offered for them at the Haltwhistle cattle show. They were present in greatest numbers in the outlying mossy region, to the north of Haltwhistle, up the South Tyne, and up the Irthing to the north of Gilsland. A bull from Balig greatly improved the cattle in some of the herds in the Haltwhistle district. This bull was not well belted. He had only a small white patch on either side. In spite of this he bred exceedingly well, his progeny all being well belted. Not many farmers have bred from belted cattle on both sides, but exceptions were—the Grahams of Wileysyke and Rotheryhaugh, Gilsland; Thomas Teasdale, Bogg, Slaggyford, whose herd existed for almost half a century; the late George Armstrong of Whiteside, Haltwhistle (who had about 16 cows); Walter Armstrong, late of Scotscoulthard, Haltwhistle (20 cows and their progeny of the direct line from the Melville Galloways, of about the first quarter of last century); and George Waugh, late of Moss Petral. The Hon. Francis Bowes Lyon took for a number of years much interest in "specialising" in the original strain, producing the most perfectly marked beasts by carefully selecting belted sires to mate with his herd of milch cows at Ridley Hall, Bardon Mill. (Plate LXIIA.)

The belt is most perfect when it goes right round the body and extends from behind the shoulder to the hooks, and thus, in cows, includes the front of the udder and two teats. White feet and tail ends are sometimes seen, but this is not permissible in a bull. Where the black and the white hair meet, about half an inch of black skin grows white hair. In a good many representatives of the breed, black patches of skin growing pure white hair occur within the white areas, and are only to be seen in summer after the winter coat is shed. It is claimed for the breed that they are bigger framed, and, though not so wild, are generally quite as robust and hardy as the black Galloways, and also better milkers; but the hair of those in the north of England is not so silky. They are practically free from tuberculosis and seldom go wrong or give trouble in parturition. For two or three weeks together in the summer of 1922 the Fat Market at Castle Douglas was topped by fat belties. White heads or "brocket" (mottled) faces, especially seen at Bladnoch, do not normally belong to this strain. It is not uncommon for a white-middled calf to appear in a herd which has been breeding black for several generations—in one case thirty-six years.

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[1] Henry Dundas (1742-1811), whose statue in St Andrew Square, Edinburgh, was erected in 1821, Lord Advocate 1775, raised to the Peerage in 1802, prosecuted politically 1803.

At his farm of **Mark**, Creetown, R. Graham, Auchengassel, Twynholm, R.S.O., has (1922) a herd of seventy, which include the £100 cow "Halmyre Bess," and the noted stirk "Halmyre Kate," both winners at the Dumfries Highland Show, 1922. The owner bred and fed "Beltie 2nd," 1st and Ch. Galloway in Edinburgh, 1912, and winner of the Ardross Cup for the best beast under two years; 1st and Ch. Galloway at Smithfield—weight 12¾ cwt. In 1913 "Beltie 2nd" was 1st and Ch. Galloway at both Edinburgh and Smithfield, and, weighing 16¼ cwt., was sold at the highest price. In 1921 a belted bullock from Auchengassel, 15 cwt. live-weight, under three years, was sold at Wallet's Christmas Show, Castle Douglas, and produced prime beef. The department of breeding stock is not neglected. In 1921 eight belted bulls sold at Newton Stewart at an average of £64, and the Knockbrex Cup for the best Belted Bull was won in 1921 and again in 1922.

Percy O. Laidlaw, Stonecroft, Northumberland, got his first two heifers early this century at the sale of Wylie Syke, Gilsland, and a bull stirk at Haltwhistle Mart. Young bulls have been got from G. B. Sproat or Robert Graham.

The **Allington Herd** of Belted Galloways (19 females and 1 bull) was established in 1920 near Lewes by G. H. Woodman. It is intended to test and develop the milking capacity of the strain under the Sussex Milk Recording Society. Nine heifers were bought from James Bone, Halmyre; two from James Brown, Knockbrex, and eight, with a beautifully marked bull, from Geo. B. Sproat, Boreland of Anwoth.

Among the **remaining herds in Galloway**, at one time prevalent in the Cree Valley, that belonging to George B.

Sproat, Boreland of Anwoth, Gatehouse of Fleet, presents many features of interest. A belted bull from Bardon Mill was used a few years ago to restore the belt to its former dimensions, as the belts had shrunk and become irregular through the repeated use of black bulls. A combination of the belted and "brocket" conditions has been secured in the same animal on two occasions, one being a belted brocket-faced bull calf born in 1904. In 1905 a dun Galloway bull was used to secure dun belties. A two-year-old bull of conspicuous merit from Sproat's herd scaled 15 cwts. in store order. The Galloway variety of the breed are "exceptionally thick, blocky, nice-haired animals, and so hardy that they can winter and calve outside and ail nothing." With fairly long outer coats, which act like thatch in throwing off rain, and the soft, abundant, and almost impenetrable undercoat, belties are well protected from the weather.

The herd of the late James Brown of **Knockbrex**, Borgue, about eight miles from Kirkcudbright, has become famous in recent years at Corseyard. It numbers 40, of which half are cows in full milk. The original herd was descended from two belted cows secured by John Sproat, Almorness, Dalbeattie, from Grennan, Dalry, and bred for fifty years to pure black bulls. George B. Sproat, son of John Sproat, took with him in 1881 two belted cows from the Almorness herd to the banks of the Fleet, where, through mating with belted bulls belonging to neighbours, "a belted herd of considerable dimensions was established."[1] It was by picked animals from this herd that the Knockbrex herd was founded in 1904. They are now grand dual-purpose cattle with an average milk record of 743 gallons, yielding 4·33 per cent. of butter-fat. Their present best cow, "Dairymaid," was bred by Robert Graham. She is (1922) eighteen years old, and has given 1000 gallons in her two last lactations. Her half-brother is R. Graham's "Beltie 2nd" (page 184). Only bulls from heavy milking cows are used in the herd. The present stock bull has as dam a 900 gallon cow, while the dam of his sire has records up to 1125 gallons, and in her last two lactations she has averaged over 1000 gallons.

The **Halmyre Herd**, Castle Douglas, dispersed in May 1922, was an offshoot from the Knockbrex herd, numbering over 32 belted animals, including 29 females of all ages. R. Graham got three of the best—a cow at £100, and stirks at £53 and £55. A four-year-old bull from a heavy milking cow, weighing 15 cwt., was sold at Castle Douglas in January 1920 for £64, 10s.

D. Gibson, Rathsherry, Broughsham, Ballymona, has a herd of 12 dun and belted Galloway cows of a milking strain, strengthened, in 1921, by a bull and a heifer from R. Graham.

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[1] George G. B. Sproat, the present representative, though keenly interested, is more of a dealer than breeder of Belties.

The **Craigeach Belties**, founded about 1870, the property of the Marquess of Bute in Kirkcowan, Wigtownshire, and managed since 1915 by David Miller, number 11 cows. They suckle their calves, and milk records are not kept, but as a keen demand for belted Galloways has sprung up since the War, all the young bulls will in future be reared for breeding purposes and sold annually at Craig's Mart at Newton Stewart.

There are two nice herds in Ross-shire, that of Sir Daniel Hamilton of Balmacara, and that of Sir Wm. Cross, Bart., of Scatwell, Strathpeffer.

Other Scotch breeders not already mentioned, who own but a few pure-bred animals, are:—T. Hume Dalziel, Twing Hurst Farm, Hurstmonceux; Captain Grierson, of Halket Leathes, Castle Douglas; Wm. Hyslop, Knockycoid, Barrhill, S. Ayrshire; J. I. Bell Irving, of Rokeby, Barnard Castle.

A beautiful dun belted bullock belonging to the Auchengassel herd was first in his class (two-year-olds) at the Smithfield Show in 1905. He was sold to feed for another year, but not being sufficiently finished only took third in 1906.

Other Beltie Fanciers and Breeders are:—J. E. Donisthorpe, Eastington Hall, Upton-on-Severn; Miss De Montgeon, Eastington Hall, Upton-on-Severn; W. E. Hayton, Sandscale Farm, Barrow-in-Furness; Colonel Pickering, M.P., Middlestown, Horbury; W. J. Anderson, Lisnamusk, Blackhill, Coleraine, Co. Derry; Captain M'Neill, Shennanton, Kirkcowan (agent, Neil M'Fadyean); Robert Muir, Clachrie, Wigtown; Sir Charles Cayzer, Bart., of Balikinrain, Perthshire (herd founded in 1920 by cattle from Knockbrex, Mark, Creetown, Boreland of Anwoth, and a bull bred by Laidlaw). There are a few herds in Ireland. One of the best is that owned by Colonel M'Calmont in Co. Cork, a draft from which was well sold at Hetherington's Mart in Carlisle in November 1921.

The Hardwick Sheeted Polled Herd.—The ancestors of a few cows bought at auction by the Earl of Rosebery in October 1916[1] "had been maintained at Hardwick for probably a century. Originally started by the crossing of Holstein and Red Polls, great uniformity of sheeting has been obtained as well as size, and in later years a sheeted Galloway bull was used with good results. In 1864 a 1st prize for cows from this herd was won at Rouen by the late Lady Cullum. The cows are heavy milkers."—(From sale catalogue.)

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[1] The previous owner of the Hardwick herd was G. Milner-Gibson-Cullum, who inherited Hardwick from his mother, a daughter of Sir Thomas Cullum, and Milner-Gibson-Cullum was the second son of the Rt. Hon. Milner-Gibson—a member of John Bright's Cabinet—who took his mother's name of Cullum.

Seven belted Galloway heifers, not guaranteed pure, were secured under the present ownership from Wm. Wallet, Castle Douglas, and a stock bull from Walter Biggar, Grange, Castle Douglas, and the herd numbers a total of 20 head.

The following **letter** was **sent to the Press** by the Author:—

"HERD BOOK" FOR BELTED AND DUN GALLOWAYS.

UNIVERSITY, EDINBURGH.
27th August 1920.

SIR,—While I am delighted to see that there is to be a *Herd Book* started for belted and dun Galloways, I greatly regret that it is not under the auspices of the Galloway Cattle Society, and I write to urge that, at the eleventh hour, an effort should be made by leading members of the Society to induce the Council to alter its policy, and include all pure, well-bred cattle of any colour, the off-coloured ones being registered in a section by themselves.

There is no doubt about the outstanding merit of a great many "belties," both as milk and beef-producers, and there is a great future for all types of Galloway in the colder regions of South America and in North-West Canada and Alaska, not to mention other continents where ranching areas are extending. The first editor of the *Galloway Herd Book*, the late Dr Gillespie, who took a wide and sound view of most agricultural and stock questions, met with decided approval my suggestion that belted Galloways should be registered in an appendix to the *Herd Book*, and I am aware that, but for his untimely breakdown in health, he would have brought the question up for consideration by the Galloway Society. The diminishing number of Galloways is now not so great that any opportunity can with impunity be missed which would increase the interest of foreign and colonial breeders and buyers in one of the most promising, if but little known, of our British breeds of "dual-purpose" cattle.—I am, etc.,

ROBERT WALLACE.

The **Dun and Belted Galloway Cattle Breeders' Association** was formed in a hurry early in 1922 with a view to making these strains eligible for entry at the Dumfries Highland 1922 Show. It is intended to breed the duns for beef and the belties as dual-purpose animals. Entries are only admitted into the *Herd Book* after inspection for purity and quality. A grading register—as an appendix—is also provided for cows having a Belted Galloway foundation, so that their female progeny, graded up by four crosses of registered Belted Galloway bulls, will be eligible for entry in the *Herd Book* proper. This arrangement will make it possible for the Hardwick Sheeted Polled Herd, and others similarly placed, to come ultimately into line as pure registered cattle.

A Statement of the Breeds and Ages of the Cattle which have won the Gold Medals, Silver Cups, and Champion Plates offered by the Smithfield Club for the best Steer (under four years old) or Ox (over four years old); and prior to 1845 *the best Cow or Heifer also; together with the names of the Exhibitors and Breeders.*

BEAST (Best in any of the Classes). Gold Medals.

	EXHIBITOR AND BREEDER.	BREED.	*yrs.*	*ms.*	*dys.*
1830[1]	Marquis of Exeter (Self)	Durham Steer	3	10	0
1831	Earl Brownlow (Self)	Durham Ox	4	7	0
1832	J. B. Topham (Self)	Durham Ox	5	7	0
1833	Wm. Townsend (Henry Townsend)	Durham Heifer	4	9	0
1834	Earl Spencer (Self)	Durham Ox	4	6	0
1835	John Dent (George Peach)	Durham Heifer	4	11	0
1836	Marquis of Tavistock (John Verney)	Hereford Steer	3	10	0
1837	R. W. Baker (Self)	Shorthorn Heifer	3	5	0
1838	Talbot's Executors (C. Hillyard)	North Devon Ox	4	8	0
1839	R. Hill (Earl of Warwick)	Hereford Ox	4	11	14
1840	Earl Spencer (Self)	Durham Ox	5	0	7
1841	R. Wright (Self)	Durham Cow	5	2	0
1842	Sir Chas. Tempest, Bt. (Maxwell)	Shorthorn Cow	6	8	0

After this year (1842) the Gold Medals were awarded to the Exhibitors instead of the Breeders.

1843	Sir Charles Tempest, Bart. (Self)	Shorthorn Heifer	4	9	0
1844	Henry Brown (Self)	Durham Heifer	4	0	0

N.B.—After this year (1844) two Gold Medals were given—one for the best Steer or Ox, and one for the best Heifer or Cow.

[1] The Gold Medal in 1830 was offered by — Kiteles.

STEER or OX (Best in the Classes). Gold Medals.

1845	R. M. Layton (P. Prosser)	Hereford Ox	4	8	0
1846	Earl of Warwick (John Thomas)	Hereford Ox	5	0	17
1847	W. D. Manning (Self)	Shorthorn Ox	4	4	0
1848	Earl of Leicester (Self)	North Devon Steer	3	8	0
1849	Richard Jones (James Cartwright)	Hereford Ox	4	10	0
1850	William Heath (James Bill)	Hereford Steer	2	10	0
1851	Edward Longmore (Self)	Hereford Steer	3	8	0
1852	Richard Stratton (Self)	Shorthorn Ox	4	10	0
1853	Richard Stratton (Self)	Shorthorn Steer	3	9	5
1854	Duke of Rutland (Self)	Shorthorn Ox	4	4	0
1855	Marquis of Exeter (Self)	Shorthorn Steer	3	10	0
1856	William Heath (John Passmore)	Devon Ox	4	5	0
1857	Edward Wortley (Self)	Shorthorn Steer	3	10	6
1858	Richard Stratton (Self)	Shorthorn Steer	2	8	21
1859	Richard Shirley (Self)	Hereford Steer	2	6	27
1860	R. W. Baker (Self)	Shorthorn Steer	3	8	0
1861	George Taylor (Christopher Clark)	Shorthorn Steer	2	11	7

After this year (1861) a Silver Cup, value £40, was substituted for the Gold Medal.

Silver Cups

1862	John Overman (Self)	Devon and Shorthorn Steer	3	4	0
1863	William Heath (Thomas Lockley Meire)	Hereford Ox	4	0	0
1864	John Walesby Kirkham (Luke Harrison)	Shorthorn Steer	2	5	20

After this year (1864) a Gold Medal to the Breeder was substituted for the Silver Medal hitherto given.

STEER or OX (Best in the Classes). Silver Cups—*continued.*

	Exhibitor and Breeder.	Breed.	*yrs.*	*ms.*	*dys.*
1865	Duke of Sutherland (Dr M'Gillivray)	Shorthorn Ox	5	8	0
1866	Richard Heath Harris (Alexander Cowie)	Shorthorn and Scotch Polled Ox	4	8	0
1867	William M'Combie (Self)	Scotch Polled Ox	4	8	0
1868	Wm. Heath (late Thos. Elesmere)	Hereford Ox	4	3	0
1869	Earl of Aylesford (Self)	Shorthorn Steer	3	2	8
1870	William Taylor (R. Stranger)	Devon Ox	4	6	0
1871	Joseph Stratton (the late Richard Stratton)	Shorthorn Ox	4	3	0
1872	James Bruce (John M'Pherson)	Aberdeen-Angus Steer	3	8	11
1873	J. S. Bult (Self)	Shorthorn Ox	4	2	0

After this year (1873) the value of the Silver Cup was increased to £50.

	Exhibitor and Breeder.	Breed.	*yrs.*	*ms.*	*dys.*
1874	J. S. Bult (Self)	Shorthorn Steer	3	2	3
1875	G. Sowerby (Self)	Shorthorn Ox	4	2	0
1876	Samuel Kidner (Self)	Devon Ox	4	1	1
1877	H.R.H. the Prince of Wales (William Shapland)	Devon Steer	3	2	0
1878	James S. Bult (Self)	Shorthorn Steer	3	11	0
1879	Henry D. Adamson (James Bruce)	Shorthorn Steer	2	5	3
1880	J. J. Colman, M.P. (James Durno)	Shorthorn and Aberdeen-Angus Steer	3	7	16
1881	Sir W. G. Gordon-Cumming, Bart. (G. Williamson)	Scotch Polled Steer	2	8	6
1882	Lewis Lloyd (Self)	Hereford Steer	2	11	23
1883	H.M. the Queen (F. Platt)	Hereford Steer	3	8	4
1884	Robert Wortley (late Charles Doe)	Hereford and Shorthorn Steer	3	6	14
1885	Robert Wortley (Hugh Gorringe)	Shorthorn Steer	2	11	12
1886	Frederick Platt (late T. Oliver)	Hereford Steer	3	6	3
1887	Sir W. G. Gordon-Cumming, Bart. (Self)	Aberdeen-Angus Steer	2	11	0
1888	John Wortley (Richard Bickle)	Devon Steer	2	11	28
1889	H.M. the Queen (James Bruce)	Shorthorn Steer	3	7	20
1890	John Cridlan (Crichton and Horn)	Shorthorn Steer	2	11	6
1891	John Wortley (T. H. Risdon)	Devon Steer	2	7	14
1892	Sir John Swinburne, Bart. (J. H. Harrison)	Shorthorn and Galloway Steer	3	5	5
1893	H.M. the Queen (Her Majesty)	Shorthorn Steer	3	6	14
1894	H.M. the Queen (Her Majesty)	Shorthorn Steer	2	11	26
1895	John Wortley (William Barneby)	Hereford Steer	2	9	11
1896	W. E. Learner (John Ross)	Shorthorn & Aberdeen-Angus Steer	2	8	17
1897	John Wortley (W. Parkin-Moore)	Galloway & Shorthorn Steer	2	10	3
1898	Executors of J. J. Colman (John Ross)	Shorthorn & Aberdeen-Angus Steer	2	11	25
1899	H.M. the Queen (Her Majesty)	Hereford Steer	2	11	21
1900	John Wortley (H. F. Russell)	Hereford Steer	2	6	24
1901	J. J. Cridlan (John Hunter)	Aberdeen-Angus Steer	2	10	25
1902	R. W. Hudson (John Ross)	Aberdeen-Angus & Shorthorn Steer	2	10	4
1903	J. J. Cridlan (J. H. Bridges)	Aberdeen-Angus Steer	2	11	24
1904	H.M. King Edw. VII. (His Majesty)	Devon Steer	2	11	0
1905	Captain A. Stirling (Finlay Munro)	Shorthorn Steer	2	8	27
1906	H.M. King Edward (His Majesty)	Shorthorn Steer	2	11	14
1907	Sir O. Mosley, Bart. (Self)	Shorthorn Steer	2	9	11
1908	M. A. M. de Hoz (John Ross)	Aberdeen-Angus & Shorthorn Steer	2	10	17
1909	Sir Richard Cooper, Bt. (Col. C. M'Inroy)	Aberdeen-Angus Steer	2	11	0

STEER or OX (Best in the Classes). Silver Cups—*continued.*

	Exhibitor and Breeder.	Breed.	*yrs.*	*ms.*	*dys.*
1910	H. M. King Edw. VII. (His Majesty)	Hereford Steer	2	10	15
1911	Capt. A. Stirling (Robert Paterson)	Aberdeen-Angus Steer	2	7	25
1912	W. M. Cazalet (George Watson)	Shorthorn Steer	2	9	8
1913	W. M. Cazalet (Lord Fitzhardinge)	Shorthorn & Aberdeen-Angus Steer	2	11	10
1914	W. M. Cazalet (Capt. A. T. Gordon)	Shorthorn Steer	1	9	7
1915	J. J. Cridlan (G. and C. Begg)	Aberdeen-Angus Steer	2	11	22
1916[1]	J. J. Cridlan (F. Gilbert)	Aberdeen-Angus Steer	2	10	3
1919	Alexander Reid (Lewis Stewart)	Shorthorn & Aberdeen-Angus Steer	2	18	14
1920	J. J. Cridlan (N. H. M'Rae)	Aberdeen-Angus Steer	2	7	30
1921	Major J. A. Morrison, D.S.O.	Aberdeen-Angus Steer	2	11	13

[1] A Gold Medal was substituted this year for the Silver Cup hitherto given.

1917 and 1918 (no exhibition). Silver Cup continued in 1919.

HEIFER or COW (Best in the Classes). Gold Medals.

	Exhibitor and Breeder.	Breed.	*yrs.*	*ms.*	*dys.*
1845	William Trinder (Lord Sherborne)	Durham Heifer	3	10	0
1846	John Booth (Self)	Durham Cow	9	10	0
1847	Earl of Radnor (Self)	Hereford and Longhorn Cross Heifer	2	8	0
1848	John Mann (Self)	Durham Cow	9	0	0
1849	Samuel Wiley (Self)	Shorthorn Cow	7	2	0
1850	Stephen Gooch (Nathaniel Cartwright)	Shorthorn Cow	5	3	0
1851	Samuel Druce (Self)	Shorthorn and Hereford Cross Heifer	3	4	14
1852	J. D. Cook (Self)	Hereford Cow	6	11	0
1853	Henry Smith (William Smith)	Shorthorn Cow	5	8	9
1854	Charles Towneley (Alexander Bannermann)	Shorthorn Cow	6	8	0
1855	Henry Ambler (late W. D. Manning)	Shorthorn Cow	7	11	16
1856	Richard Stratton (Self)	Shorthorn Cow	5	8	9
1857	Lieut.-Col. Towneley (Self)	Shorthorn Cow	4	1	0
1858	J. W. Brown (Self)	Shorthorn Heifer	3	10	21
1859	Lieut.-Col. Towneley (Self)	Shorthorn Heifer	3	7	2
1860	Richard Hill (Self)	Hereford Cow	5	2	0
1861	John Faulkner (Sir J. Harper Crewe, Bart.)	Shorthorn Cow	5	10	0

After this year (1861) a Silver Cup, value £40, was substituted for the Gold Medal.

1862	Robert Tennant (Self)	Shorthorn Heifer	3	6	10
1863	Charles Swaisland (Lady Lubbock)	Shorthorn Heifer	3	10	0
1864	Richard Taylor (Self)	Shorthorn Heifer	3	8	21

After this year (1864) a Gold Medal to the Breeder was substituted for the Silver Medal hitherto given.

1865	Earl of Radnor (Self)	Shorthorn Heifer	3	3	0
1866	Richard Stratton (Self)	Shorthorn Cow	4	10	14
1867	Henry Bettridge (E. Tanner)	Hereford Heifer	3	6	0
1868	Earl of Hardwicke (Self)	Shorthorn Heifer	3	5	21
1869	Sir W. C. Trevelyan, Bart. (Self)	Shorthorn Cow	5	3	21
1870	Trevor L. Senior (late Charles Gibbs)	Devon Heifer	2	6	0
1871	James Bruce (Alexander Paterson)	Scotch Polled Heifer	3	8	14
1872	Trevor L. Senior (Walter Farthing)	Devon Heifer	3	4	3
1873	John Walter, M.P. (Harry Micklem)	Shorthorn Heifer	3	2	0

After this year (1873) the value of the Silver Cup was increased to £50.

HEIFER or COW (Best in the Classes). Gold Medals—*continued.*

	Exhibitor and Breeder.	Breed.	*yrs.*	*ms.*	*dys.*
1874	Richard Stratton (Self)	Shorthorn Heifer	2	9	0
1875	William Fox Beaven (Self)	Shorthorn Heifer	3	9	0
1876	Joseph Stratton (Self)	Shorthorn Heifer	3	11	0
1877	N. Catchpole (Self)	Shorthorn Heifer	3	7	0
1878	Richard Stratton (Self)	Shorthorn Heifer	3	10	14
1879	Richard Stratton (Self)	Shorthorn Heifer	3	7	19
1880	Charles Thos. Lucas (Self)	Shorthorn Heifer	3	6	0
1881	Sir W. G. Gordon-Cumming, Bart. (Self)	Scotch Polled Heifer	2	8	0
1882	Richard Stratton (Self)	Shorthorn Heifer	3	10	27
1883	H.M. The Queen (George Turner)	Shorthorn Heifer	2	8	17
1884	John Strachan (Self)	Scotch Polled Heifer	2	10	5
1885	Clement Stephenson (Self)	Aberdeen-Angus Heifer	2	8	4
1886	J. J. Colman, M.P. (Joseph Stratton)	Shorthorn Heifer	2	8	14
1887	Clement Stephenson (G. S. Grant)	Aberdeen-Angus Cow	5	7	15
1888	J. G. Macgregor (Self)	Aberdeen-Angus and Shorthorn Cross	1	8	12
1889	Clement Stephenson (Self)	Aberdeen-Angus Heifer	2	11	27
1890	H.M. The Queen (William Duthie)	Shorthorn Heifer	2	9	10
1891	H.M. The Queen (Her Majesty)	Shorthorn Heifer	2	9	14
1892	Robert Copland (George Fraser)	Cross-bred Heifer	2	10	14
1893	J. D. Fletcher (Self)	Aberdeen-Angus Heifer	2	11	13
1894	Clement Stephenson (Self)	Aberdeen-Angus Heifer	2	11	20
1895	H.M. The Queen (Her Majesty)	Shorthorn Heifer	2	10	17
1896	Earl of Strathmore (Self)	Aberdeen-Angus Heifer	2	11	21
1897	Earl of Rosebery, K.G. (Jas. Lawson)	Aberdeen-Angus Heifer	2	8	28
1898	Earl of Strathmore (Self)	Aberdeen-Angus Heifer	2	10	12
1899	W. E. Learner (John Ross)	Shorthorn and Polled Cross Heifer	2	9	7
1900	W. E. Learner (John Ross).	Shorthorn and Polled Cross Heifer	2	9	29
1901	Earl of Strathmore (Self)	Aberdeen-Angus Heifer	2	9	9
1902	Earl of Strathmore (Self)	Aberdeen-Angus Heifer	2	10	0
1903	R. L. Batchelor (William Charles)	Shorthorn and Aberdeen-Angus Cross Heifer	2	10	22
1904	Earl of Rosebery, K.G. (John Ross)	Shorthorn Heifer	2	8	27
1905	Col. Charles M'Inroy, C.B. (Self)	Aberdeen-Angus Heifer	2	10	26
1906	Earl of Rosebery, K.G. (Self)	Aberdeen-Angus Heifer	2	10	5
1907	Earl of Rosebery, K.G. (Self)	Aberdeen-Angus Heifer	2	9	5
1908	Countess Dow, of Seafield (Self)	Aberdeen-Angus Heifer	2	10	18
1909	R. W. Hudson (Self)	Aberdeen-Angus and Shorthorn Heifer	2	11	17
1910	J. J. Cridlan (Self)	Aberdeen-Angus Heifer	2	11	21
1911	W. T. Garne & Son (Selves)	Shorthorn Heifer	2	10	10
1912	Earl of Rosebery, K.G. (D. Stewart)	Shorthorn Heifer	2	7	14
1913	Duke of Portland, K.G. (Self)	Aberdeen-Angus Heifer	2	9	0
1914	J. J. Cridlan (Self)	Aberdeen-Angus Heifer	2	7	25
1915	H.M. King George (His Majesty)	Shorthorn Heifer	2	9	21
1916[1]	J. J. Cridlan (J. and G. Grant)	Aberdeen-Angus and Shorthorn Cross Heifer	2	10	24
1917 and 1918 (No exhibition.)					
1919	J. F. Cumming (J. Robertson)	Aberdeen-Angus Shorthorn Cross Heifer	1	8	5
1920	Sir R. A. Cooper, Bart. (J. Robertson)	Aberdeen-Angus Shorthorn Cross Heifer	2	8	5
1921	A. W. Howison	Shorthorn and Aberdeen-Angus-Shorthorn Heifer	1	9	4

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[1] A Gold Medal was substituted this year for the Silver Cup hitherto given.

BEST BEAST (not exceeding Two years old).
Silver Cup (Value £25).

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1899	Miss A. de Rothschild (Baron F. J. de Rothschild)	Aberdeen-Angus and Shorthorn Steer	1	11	15
1900	John Ross (Self)	Polled and Shorthorn Cross Heifer	1	11	11
1901	H.M. The King (His Majesty) .	Shorthorn Steer . . .	1	8	15
1902	H.M. King Edward (Her late Majesty The Queen)	Hereford Steer . . .	1	11	14
1903	R. W. Hudson (Self) . . .	Shorthorn and Aberdeen-Angus Cross Heifer . .	1	10	16
1904	John Ross (Self)	Shorthorn and Aberdeen-Angus Cross Heifer . .	1	9	1
1905	R. W. Hudson (Self) . . .	Aberdeen-Angus and Dexter Heifer	1	11	7
1906	John Ross (Self)	Shorthorn Steer . . .	1	8	23
1907	H.M. King Edward (His Majesty)	Shorthorn Steer . . .	1	10	21
1908	R. W. Hudson (Self) . . .	Aberdeen-Angus and Shorthorn Steer . . .	1	11	15
1909	R. W. Hudson (Self) . . .	Aberdeen-Angus and Shorthorn Cross Heifer . .	1	11	18
1910	Captain A. Stirling (R. Paterson) .	Aberdeen-Angus Steer . .	1	7	25
1911	H.M. King Edward (His Majesty)	Shorthorn Steer . . .	1	10	21
1912	Col. Chas. M'Inroy, C.B. (Self) .	Aberdeen-Angus Steer . .	1	9	16
1913	J. Ernest Kerr (Self) . . .	Aberdeen-Angus and Shorthorn and Ayrshire Cross Steer	1	10	28

After 1913 a Silver Cup, value £20, was offered for the best Steer not exceeding two years old, and a Silver Cup, value £20, for the best Heifer not exceeding two years old.

STEER (not exceeding Two years old).

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1914	W. M. Cazalet (Capt. A. T. Gordon)	Shorthorn	1	9	7
1915	H.M. King George (His Majesty) .	Shorthorn	1	10	22
1916	J. and G. Young (J. W. Gordon Oswald)	Shorthorn	1	11	3

A Silver Medallion was substituted this year for the Silver Cup hitherto given.

1917 and 1918 (No exhibition).

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1919	C. W. D. Perrins (Self) . . .	Aberdeen-Angus . . .	1	7	10

This year (1919) the Silver Cup was again offered.

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1920	Major J. A. Morrison (Self) . .	Aberdeen-Angus . . .	1	11	13
1921	Lieut.-Col. G. A. Ferguson (Self) .	Aberdeen-Angus and Shorthorn-Aberdeen-Angus .	1	7	9

HEIFER (not exceeding Two years old).

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1914	Col. Chas. M'Inroy, C.B. (Self) .	Aberdeen-Angus . . .	1	11	2
1915	J. Stewart Clark (Self) . . .	Aberdeen-Angus . . .	1	8	11
1916	J. F. Cumming (J. and G. Grant) .	Aberdeen-Angus . . .	1	11	19

A Silver Medallion was substituted this year for the Silver Cup hitherto given.

1917 and 1918 (No exhibition).

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1919	J. F. Cumming (J. Robertson) .	Aberdeen-Angus — Shorthorn Cross	1	8	5

This year (1919) the Silver Cup was again offered.

	Exhibitor and Breeder.	Breed.	yrs.	ms.	dys.
1920	R. S. M'William (W. Wilson) .	Aberdeen-Angus Cross . .	1	11	26
1921	A. W. Howison (Self) . . .	Shorthorn and Shorthorn-Aberdeen-Angus-Shorthorn	1	9	4

N.B.—See the *History of the Smithfield Club from* 1798 *to* 1900, by E. J. Powell, Secretary, published by the Club in 1902.

See also "The Relative Growth and Development of Various Breeds and Crosses of Cattle," by J. Hammond, M.A., Animal Nutrition Institute, School of Agriculture, Cambridge, in *The Journal of Agricultural Science*, vol. x., part 3, July 1920.

CHAPTER X

MILCH CATTLE. THE AYRSHIRE. THE KERRY AND DEXTER, AND THE BRITISH FRIESIAN

Introduction — **The Ayrshire** — Habitat—Historical Records — Judging Points of Dairy Cattle—Student's Score Card — Cattle Introduced to Improve the Ayrshire Breed—Kilmarnock Farmers' Club Minutes—The Type early in the Eighteenth Century — Milking Records—Influence of Soil and Climate—Points of the Ayrshire—Milk and Butter Yields — Bullocks — Ayrshires Abroad — List of Prominent Breeders—**Irish Breeds**—**The Kerry**—The Irish Cottar's Cow—Milk Records—History of the Breed—Breed Societies and *Herd Books*—Weights — Fat and Milk Records — Points — **The Dexter** — Points and Peculiarities—Speculation as to its Origin—Pioneers of Kerry Introduction into England—Kerry Crosses with other Breeds—**The British Friesian**—**Dutch Cattle** in Europe and America—Points—Herds in this Country—**The Blue Albion**—Derbyshire Dual-Purpose Breed—Points and Merits—Breeders.

INTRODUCTION.—Though certain strains of cattle already described—notably the Welsh and the Red Polled breeds—are good general-purpose breeds, yet they could not be properly classed among those specifically kept for milk production. We shall find, on the other hand, that some which are distinctly and unmistakably milking breeds are nevertheless capable of producing excellent beef. The Shorthorn occupies a unique position in this connection, as non-pedigree dairy cows of this breed are more numerous, taking the United Kingdom as a whole, than all the cows of the special dairy breeds to be described put together.

The Ayrshire Breed has come more into prominence in comparatively recent times, although its milking reputation is not new.

Its original habitat was Cunningham, or the upper of the three divisions of Ayrshire—Carrick, Kyle, and Cunningham—occupying that part of the county which lies north of the river Irvine.

The records[1] **of the early history** of the breed fix the date of the beginning of improvement from 1750 to 1780. Before that time it is believed that the native progenitors of the Ayrshire were small, inferior, irregularly-shaped animals, with short crumpled horns, and of a black, black-and-white, or brown colour, but hardy, and suited to the humidity and inferiority of the district in which they were placed. The deep rings at the bases of the horns indicated the hardships they annually endured. But the wonderful results that have been attained, prove them to have been an ideal foundation stock.

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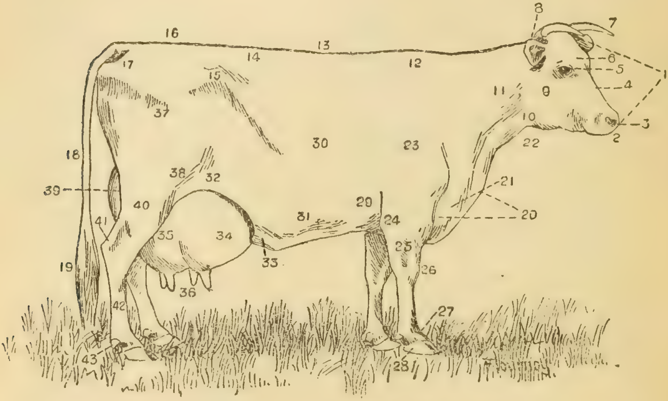
[1] Colonel Fullarton's *Survey of Ayrshire;* Aiton's *General View of the Agriculture of the County of Ayr*, 1811; Aiton's *Dairy Husbandry of Ayrshire*, 1825; Low's *Domesticated Animals*, 1845; Farrall's "Essay on the Ayrshire Breed of Cattle" in the *Transactions of the Highland Society* for 1876, and in Vol. I. of the *Ayrshire Herd Book*, 1877; Gilbert Murray's

FIG. 9.



POINTS OBSERVED IN JUDGING DAIRY CATTLE.

(From the U.S.A. *Circular*, No. 48, June 1904.)

1. Head.
2. Muzzle.
3. Nostril.
4. Face.
5. Eye.
6. Forehead.
7. Horn.
8. Ear.
9. Cheek.
10. Throat.
11. Neck.
12. Withers.
13. Back.
14. Loins.
15. Hip-bone.
16. Pelvic arch.
17. Rump.
18. Tail.
19. Switch.
20. Chest.
21. Brisket.
22. Dewlap.
23. Shoulder.
24. Elbow.
25. Forearm.
26. Knee.
27. Ankle.
28. Hoof
29. Heart girth.
30. Side, or barrel.
31. Belly.
32. Flank.
33. Milk vein.
34. Fore udder.
35. Hind udder.
36. Teats.
37. Upper thigh.
38. Stifle.
39. Twist.
40. Leg, or Gaskin.
41. Hock.
42. Shank.
43. Dew claw.

The Ayrshire of the present day is very different. The change was brought about by crossing with other breeds, by subsequent careful selection, and better feeding and manage-

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notice of the "Ayrshire Breed of Cattle" in J. Coleman's *Cattle of Great Britain*, 1875; and Wm. Rodden's "Presidential Address to the Ayrshire Importers' and Breeders' Association of Canada," in Vol. I. of *The Canadian Ayrshire Herd Record*, 1886; *The Ayrshire Breed* issued by the Ayrshire Cattle Society in 1920. Ortelius, writing in 1573, speaks of a superior class of oxen in Carrick; but his remarks no doubt refer to the ancestors of the Galloway breed, not to Ayrshire cattle as the term is now understood.

Compiled by K. J. J. MACKENZIE, M.A., and THEO. R. ROBINSON.

Name or Description of Cow.. *Weight and Age*..	Max. Points.	Student's Estimate.	Instructor's Estimate.
GENERAL APPEARANCE—25 per cent.			
Temperament, active, yet quiet to handle	5	......	......
Form, distinctly feminine, lighter in fore-end than in flank or quarter	3	......	......
Quality and Touch. *Skin soft, moderately thin, very flexible and elastic (handle over the paunch). The whole animal covered with soft, fine hair * Skin of an unctuous, oily nature, denoting butter-fat.	9	......	......
Action, head slightly raised and gracefully carried when walking, movement free from sweeping motion, and active	3	......	......
Legs, not too long, bone fine, and joints true	5	......	......
UDDER, MILK VEIN, AND ESCUTCHEON—23 per cent. (All four quarters sound, otherwise disqualifies.)			
An easy milker	2	......	......
The Bag, carried well forward, extending well up and wide behind	4	......	......
Teats, wide apart and equidistant from each other, equal in size, well shaped, and of moderate length	2	......	......
The whole Udder showing great capacity	4	......	......
Quality, soft and mellow to the touch, covered with loose, elastic, velvet-like skin, showing the veins	6	......	......
Milk Veins, large, prominent, and tortuous	2	......	......
Escutcheon, wide at thighs, and fine hair running up vertically. Above the hind teats showing two oval patches of down-growing hair	3	......	......
HEAD AND NECK—6 per cent.			
Horns, fine and waxy, and gracefully curved. A yellow base indicating quality of milk *Face*, moderately long, clean cut, and lean, wide across forehead *Eyes*, bright and prominent, yet showing gentleness and intelligence *Nose*, healthy, with large sensitive nostrils *Ears*, fine and mobile, well fringed with hair. Inside of ear yellow	4	......	......
Neck, long (compared with beef animals), fine at its junction with the head, and spreading out gracefully to meet the shoulders	2	......	......
FORE-QUARTERS—12 per cent.			
Chest, deep, showing plenty of room for heart and lungs	5	......	......
Brisket, prominent, dewlap fine, with loose skin	1	......	......
Shoulders, well laid back, fine, close at the points	3	......	......
Chine, narrow	3	......	......
BODY—18 per cent.			
Back, wedge-shaped when seen from above, of good moderate length	5	......	......
Ribs, well sprung and deep	4	......	......
Abdomen, very capacious, but not baggy and unsightly	6	......	......
Flank, deep and firm to touch	3	......	......
HIND-QUARTERS—16 per cent.			
Hips, wide apart and neat (a hollow between spine and point of hips is desirable for milk)	3	......	......
Quarters, long	4	......	......
Pin-Bones, far apart	2	......	......
Tail, put on level with the spine, long, fine, and tapering to a point, and showing a good tassel	2	......	......
Thighs, sinewy, long, thin, and well bent	5	......	......
Total	......	......	......

ment, in addition to the natural tendency which soil and climate admittedly have in developing and maintaining certain qualities or characteristics.

The breeds definitely mentioned in history as having been **imported** and used in crossing with the native cattle, are the Teeswater, or early Shorthorn, and the Alderney.[1]

> "In 1750 the Earl of Marchmont purchased from the Bishop of Durham several cows and a bull of the Teeswater or some other English breed, of a light brown colour, spotted with white; these his lordship kept for some time at his seat in Berwickshire. Bruce Campbell, who was the factor on his lordship's estates in Ayrshire, carried some of the breed into Kyle; from thence their progeny spread throughout the country. A bull from the stock was sold to John Hamilton of Sundrum, who raised a numerous herd from that strain."

"Stranger cattle" of unknown or unrecorded breeds were imported by John Dunlop of Dunlop House, John Orr of Barrowsfield, and other dairy farmers. And in probably more recent times West Highland crosses have been taken into the breed. The resemblance of the Cadzow and the Chillingham Park Wild Cattle to certain strains of the Ayrshire breed—in horn, in colour, and in form—points to a Wild Forest breed connection. The improvement in the milking qualities was no doubt largely due to the cross with the cattle introduced. To that also may in some measure be safely attributed the distinct tendency among Ayrshires to become lighter in colour than those of a generation or more ago; indeed, the result is a most natural one to expect when the broad lines of the facts before us are considered. A little, inferior, dark-coloured, poor-milking breed of cattle is found in a given district; it is improved in size and milking qualities by crossing with an imported breed, which gives greater variety of colour and a greater admixture of white. During subsequent selection, carried on with the main object of increased milk production, it is most natural to suppose that the animals showing large proportions of new blood or a tendency to reproduce the new and improved types would be favoured and preserved on account of form, size, and good milking qualities; and that along with these would be associated the tendency to whiteness, a correlated original attribute of the imported blood.

In 1806 the "Rules and Regulations of the **Kilmarnock Farmers' Club**, instituted in 1793, were drawn up," and the objects of the Club were declared to be "the improvement of Agriculture and the Breed of Black Cattle in Ayrshire." Shows described as "Shows of Black Cattle" were held from 1808 onwards. In 1811 "the Club agrees that there shall be a show of cattle in the Town Green of Kilmarnock," and no mention of the word "Black" afterwards occurs. A resolution of thanks to Wm. Ayton, Writer, Strathaven, was passed 6th May 1814, "for the very great trouble he had taken in bringing into due estimation the superior excellence of the Ayrshire breed of dairy cows," and his treatment of the dairy stock in his *Survey of Ayrshire* was commended. The minute also speaks of "the great demand for our dairy breed from all parts of Great Britain, but particularly from England." And when it spread to the other districts of Ayrshire and to the neighbouring counties it became the Ayrshire breed.

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[1] Probably more correctly termed the Jersey, as cattle were sent to Scotland, according to Colonel le Couteur, by two successive governors of Jersey—Field-Marshal Conway and Lieutenant-General Andrew Gordon.

In the early part of the nineteenth century it had well distributed itself over the south-western counties, including Lanarkshire, Renfrewshire, Wigtownshire, Bute, and Arran.

The Improved Ayrshire of the early part of the nineteenth century is thus described in one of the oldest records:—

> "Their colours vary from a dark brown to different shades of red, and some are approaching a cream colour. The head and horns are fine, some strong near the head, and wide apart, the eye bright but mild. They have a fine neck with little dewlap, are round and straight in the barrel, and free from disposition to rise in the backbone, light in the upper part of the shoulder, flat and wide in the loin and space between the hips, with a capacious udder extending well both forward and behind, and broad, held well up to the body, with teats standing much apart and not of great length, having good-sized milk veins; the tail long and light, the skin soft, having fine woolly hair, and legs short, with fine bone and firm joints. They yield a large return in proportion to the food they require; they easily fatten their calves. Their produce of milk varies from one thousand gallons in one year, when in their best condition, down to seven or eight hundred gallons when not at their best, each twenty-eight to thirty gallons making twenty-four pounds of cheese. Their usual yield of butter is a pound and a half to three and a half or four gallons of milk, according to the feed they get. They will do well on pastures that could not support heavier cattle. A breed of dairy cows that will weigh from nine to eleven or twelve hundred pounds are thought the most preferable."

Wilkinson's definition of a milch cow exactly described the Ayrshire of this period:—

"She's long in the face, she's fine in her horn,
She'll quickly get fat without cake or corn,
She's clear in her jaws, and full in her chine,
She's heavy in flank, and wide in her loin.[1]

"She's broad in her ribs, and long in her rump,
A straight and flat back, with never a hump,
She's wide in her hips, and calm in her eyes,
She's fine in her shoulders, and thin in her thighs.

"She's light in her neck, and small in her tail,
She's wide in her breast, and good at the pail,
She's fine in her bone, and silky of skin,
She's a grazier's without, and a butcher's within."

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[1] The Ayrshire pronunciation of loin, *i.e.* "line," rhymes with chine.

The improved Ayrshire was **taken to Carrick**, the division of the county south of the river Doon, by Fulton in 1790; and Ralston established the first herd in **Wigtownshire** in 1802. They were introduced into **Dumfriesshire** towards the end of the eighteenth century—the estate of Hope Johnston of Annandale being one of the first centres favoured. The poet Burns—then at Ellisland, near Dumfries, where he kept a dairy and made cheese—refers in a letter, dated 1788, to a heifer presented to him by Dunlop of Dunlop, which he designated the "finest quey in Ayrshire."

There are indications that, although the Ayrshire is now accepted as a pure breed, all the characteristics contributed by the various breeds employed in its formation have not yet been thoroughly distributed and blended. Proof of this may be seen in the fact that the strains of Ayrshires which are most successful as prize-winners in the "eild"[1] classes (for bulls and heifers), seldom produce animals which are very successful when shown "in milk." These cows may give as much milk as those belonging to the strains celebrated for producing successful winners in the classes for animals in milk, but their udders are rarely symmetrical enough to enable them to carry off the prizes, although they possess an advantage over the others in style and in a more perfect form of body. Stress on certain points in the show ring has also had its influence. The fashion for the light colour, small teats, and heavy fore-quarters in showyard animals, has developed much since Lawrence Drew of Merryton took the first prize for an Ayrshire cow in milk with "Collyhill," at the Highland Society's Show in Edinburgh in 1859. This cow also took the first prize for an Ayrshire in milk at the Royal Agricultural Society's International Show at Battersea in 1862, and a painting of her by Gourlay Steel, the property of the Highland Society at 3 George IV. Bridge, Edinburgh, formed the original of the frontispiece in Vol. I. of the *Ayrshire Herd Book*. "Burnhouse" (8), a brown bull, was the progenitor of many white prize-winners.

Some modern specimens of the breed, when reared under circumstances of soil and climate suitable for beef production, **fall away** from the true Ayrshire characteristics, assume strong bones, heavy and fleshy fore-quarters and chest, and also decline in milking powers; but changes such as these are usually dependent upon local surroundings, and have been already fully explained. The best preventive of the worst results of the tendency to coarseness through high feeding, is to arrange that the heifers shall calve at two years old in place of three years, the ordinary calving time of the breed. Should the calf arrive when the quey is two years old, her milking powers become better developed, and the tendency to produce flesh is checked.

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[1] "Eild" "yell," or "yeld" the Scotch expression to indicate cattle, whether male or female, that do not yield milk.

The Kilmarnock Farmers' Club held the first of a series of Ayrshire Cattle Shows in 1808, which were local and restricted to members. Of a general Sweepstake Show in 1828 open to farmers of Kyle and Cunningham, it was recorded:—"The bulls attracted much attention, being all of the famous Cunningham breed." Theophilus Paton of Swinlees, "to whose herd many of the Ayrshires of the present day are traced" won first prize for the best bull. The Highland and Agricultural Society first gave premiums for Ayrshire bulls and heifers in 1814 and 1816, but only in Kyle, which recognition rather upsets the West Country adage:—"Kyle for a man, Carrick for a 'coo,' Cunningham for butter and cheese, and Gallowa' for 'woo.'" The Highland premiums for 1821 were opened to Kyle and Cunningham and in the following year to Carrick also. It was not till the 1825 Show in Glasgow that Ayrshires were admitted from Renfrew, Lanark, and Stirling. Shows for Ayrshires followed in Dumfries 1830, Stirling 1833, and the first (and last) Highland Show in Ayr in 1835. The Ayrshire Agricultural Association was formed in the same year, and its first Show at Kilmarnock was held on 10th June 1836; thereafter till 1852 the Show was itinerant within the county, when "it was decided to hold the Show at Ayr in the future," and achieved success.

The "**Ayrshire Derby**" was established in 1872 by the Ayrshire Agricultural Association, when premiums open to Scotland were offered for three-year-olds in calf or in milk, entries being made the year before; and it "has been continued with success ever since." The largest number of heifers shown was 186 in 1879.

The **Ayrshire Cattle "Herd Book" Society** of Great Britain and Ireland was founded in 1877 in Ayr, and the first volume of a *Herd Book*, compiled by the Hon. G. R. Vernon, was issued in 1878, containing 563 entries—446 cows and 117 bulls. A novel feature was the posthumous entry of the bulls "Rab" (33), calved in 1854, and "Burnhouse" (8), calved in 1865. A volume of the *Herd Book* has been issued annually since 1878. It is estimated that the number of living registered breeding cows in 1920 exceeded 50,000. The Society is now urging improved methods in judging dairy breeds, and it held the initial show to demonstrate its ideals in 1921.

The **distinguishing or characteristic points** of an Ayrshire cow necessary to supplement Mackenzie's general score card for a milch cow, page 195, are as follow:—*Size*—medium, the cow in full milk weighing 800 to 1000 lb., up to 1200 lb. in the case of larger types suitable for the best dairy pastures and favourable conditions of locality and climate. *Figure*—wedge-shaped or tapering towards the fore-quarters. *Face*—medium in length, slightly dished, clean cut, showing veins. *Muzzle*—broad and strong, without coarseness. *Nostrils*—large. *Eyes*—full and bright with placid expression. *Brisket*—light. *Neck*—a good length and well carried ; fine, with a minimum of loose skin. *Udder*—long, wide, deep, but not pendulous or fleshy, firmly attached to the body, extending well up behind and far forward. *Quarters*—sound and even, sole nearly level, with little indentation between the teats, udder veins well developed and plainly visible. *Teats* [1]—evenly placed, distance apart from side to side equal to half the breadth of udder; from back to front equal to one-third the length; length 2½ to 3½ inches, thickness in proportion to length, hanging perpendicularly and slightly tapering, giving a free flow of milk when pressed. *Mammary veins*—two or more, large, long, tortuous, branching and entering capacious milk wells. *Colour of hair*—"red of any shade, brown, or brown and white, mahogany and white, black and white, or white, each colour distinctly defined." (Brindled markings allowed but not desirable.) *Skin*—of medium thickness, mellow and elastic. *Hair*—soft and fine. *Secretions of the skin*—of a rich brown or yellow colour.

The points of the bull differ from those of the cow only in the masculine characters, which, according to the general rule, ought to be distinctly defined, although at one time a feminine tendency in the appearance of the bull was thought to indicate that he belonged to a good milking strain. The scrotum should be white, and, still more important, the rudimentary teats large and well apart. He should come of a strain noted for milk yield. His weight at maturity should be 1200 to 1500 lb.

The Ayrshire is unquestionably the most important and the **most typical** example of a milking cow in the British Isles. She shares with the Kerry the credit of being able to yield a greater return of dairy produce on poor land and inferior food than any other cow. She is essentially a cheese-dairy cow, on account of the comparatively small-sized butter globules of the milk. The Channel Islands breeds supply, on the other hand, the true butter-dairy cows, owing to the large-sized globules which the specially rich and highly-coloured cream contains. In the same way the non-pedigree milking Shorthorn is the typical cow for town dairying, for the supply of large quantities of milk of moderate quality for immediate domestic use, and for the accumulation of beef of second quality as a by-product during the latter portion of the milking period.

[1] Teats that are pigmented are not so liable to chap as pale teats. Teats should be freed from warts.

Ayton put the **milk yield** of some cows at 5 or 6 gallons, and later as "extraordinary returns," 6 to 7 gallons per day for six or eight weeks. **Farrall** says: "Several, when in their best plight and well fed, will yield 4 gallons per day for three months, and produce a total of 800 to 900 gallons per cow. As an average 600 gallons per cow for the year has been mentioned, but on the poorest farms the average return falls far short of this, and cannot be more than 480 to 500 gallons."

Gilbert Murray gives results of a milking competition held at Ayr in April 1861, as follows:—

Name of Owner.	Greatest Meal.		Average of 4 Meals.		Weight of Butter.	
	lb.	oz.	lb.	oz.	lb.	oz.
A. Wilson	28	12	24	3½	2	2
J. Henderson	26	0	24	5	2	14½
W. Reid	25	7	20	8¾	2	9
W. Reid	30	15	27	5½	3	6½
R. Wallace	28	14	28	8½	1	9½
R. Wallace	25	5	23	8	1	15

Rodden quotes **U.S.A. Official Reports** of cows of 10,220 lb. milk, to 10,907 lb. live-weight in 1885. Six cows showed an average of 7054 lb. each for twelve months. One cow of only 875 lb. l.-w. gave 1174½ lb. of milk in thirty days, yielding 14 lb. 5 oz. of butter weekly. Another cow in seven days gave 464 lb. of milk, yielding 19 lb. 6 oz. of butter. Another test gave 1 lb. of butter for 17 lb. of milk. The greatest milk yield per day was 74 lb. "Rena Ross" (14539), an aged Ayrshire cow of the old-fashioned type, with dark mottled colouring and downward set horns, owned by Highland Farm, Bryn Mawr, Pennsylvania, is one of the greatest milk cows on record. She and five daughters have thirteen records averaging 13,114 lb. milk and 532·84 lb. butter.

At the great Show at Pietermaritzburg, held near the end of June 1921, a Colonial-bred four-year old Ayrshire cow, "Rocklands Phemie 2nd," belonging to F. Stockil, Winterton, Natal, won in the milking competition open to all breeds under B.D.F.A. rules (quantity and quality); and also the Cup for the cow giving the greatest amount of butter fat in 48 hours, her test for two consecutive milkings averaging 7·18 per cent., believed to be a world's record. This cow was got by "Mains of Airies Blacksmith," bred by a blacksmith in the Ervie district, near Stranraer. As a heifer in the hands of Alex. Drysdale, Johannesburg, she had the distinction of winning the Breed Championship at Johannesburg Show in 1918.

The continental method of **co-operative milk and butter testing** every fourteen days has recently been more widely recognised. Within eleven years from its initiation, Denmark developed 400 Milk Record Societies. Sweden had also 200 similar institutions in 1905. By means of elimination of the poor-milking strains on the basis of the records made, the

Vallåkra ("Grazing Fields") Society in Southern Sweden, in six years, increased the average yield per cow 31 per cent., or over 5 per cent. annually. The increase in the year's milk was from 670 gallons to 876 gallons, and the percentage of butter-fat from 3·09 to 3·21 per cent. Kuperus, at Marsum, Holland, with a herd of thirty-five cows, made a still greater improvement in eight years:—

Year.	Fat p.c.	Year.	Fat p.c.	Year.	Fat p.c.	Year.	Fat p.c.
1897 . .	3·15	1899 . .	3·39	1901 . .	3·47	1903 . .	3·50
1898 . .	3·28	1900 . .	3·46	1902 . .	3·44	1904 . .	3·52

The **Scottish Milk Records Association** was constituted in 1902. Although there was a little set-back in its progress during 1918, owing to after-effects of war conditions and an abnormally dry year, there is sufficient evidence from that and former years' milk records of "steady improvement in the inherent or hereditary milking qualities of the herds tested." Its last Annual Report, for 1919, shows a membership of 47, representing 25 approved Milk Record Societies, which contain 491 members and record the milking results of 20,786 cows as follows:—

Name of Society.	No. of Members.	No. of Cows Tested.	Interval between Tests, in Days.	Duration of Recording Season, in Weeks.
1. Annandale	24	1,118	27	52
2. Ayr and Stair	21	960	23	52
3. Central Ayrshire, No. 1 . .	19	685	21	52
4. Cumnock	18	607	21	52
5. Dumbartonshire	14	558	18	52
6. Dumfries and Nithsdale (Lower)	22	815	26	52
7. " " (Upper)	21	947	26	52
8. Dunragit	17	1,156	22	48
9. Fenwick (High)	19	715	22	52
10. Fife	19	754	24	52
11. "John Speir"	24	662	28	52
12. Kirkcolm and Leswalt . .	19	1,174	22	47
13. Kirkmaiden and Stoneykirk .	14	1,206	21	39
14. Lesmahagow	22	620	28	52
15. Lower Wigtownshire . . .	22	1,234	28	47
16. Mauchline and Coylton . .	19	710	22	52
17. Monkton and District . . .	20	774	21	52
18. Montgomerie	20	679	28	52
19. North of Scotland . . .	11	213	28	21
20. Ochiltree	20	606	22	52
21. Renfrewshire (Lower Ward) and Bute	24	460	28	47
22. Renfrewshire (Upper Ward) .	17	638	20	52
23. Stewarton and Dunlop . .	21	738	26	52
24. Stewartry, No. 1	22	1,331	26	52
25. " No. 2	22	1,427	26	52
Total No. . .	491	0,786		

The **foregoing table** shows for each Society the number of members, the number of cows tested, the interval between the tests, and the duration of the recording season (1919).

The records are of the estimated quantity of milk produced by each cow in a separate lactation, and of the estimated milk fat contents. A gallon of milk is reckoned at 10 lb., not the normal 10⅓ lb. The other **minor particulars** noted are:—

Name of cow; byre number and *Herd Book* number. Sire of cow and *Herd Book* number. Dam of cow and *Herd Book* number. Age of cow at the start. Date of calving preceding opening of record. Number of weeks in milk. Date of next calving after record closed, together with facts *re* the preceding record. Quantity of milk in gallons. Percentage of butter-fat. Number of weeks in milk.

Trained recorders visit the farms at intervals varying from fourteen to twenty-eight days and secure results which "approximate closely to the actual milk yields."

Classification.—Cows and heifers are separated into three groups, and the yields are calculated "at their estimated equivalent in milk of 1 per cent. of milk fat, taking both quantity and quality into consideration. Class I. contains cows giving not less than 2500 gallons of milk with 1 per cent. of fat, and heifers not less than 2000 gallons at 1 per cent. of fat. Class III. embraces cows and heifers giving less than two-thirds of these amounts, *i.e.*, 1660 and 1330 gallons respectively.

Table showing corresponding values of these yields in milk with 3·5 per cent. of fat:—

Class.	Yield of Milk of 1 per cent. Fat.	Corresponding Yield of Milk of 3·5 per cent. Fat.
Cows in Class I. .	Not less than 2500 gallons .	= 714 gallons
Heifers in Class I. .	,, ,, 2000 ,, .	= 571 ,,
Cows in Class III. .	Less than 1660 gallons .	= 474 ,,
Heifers in Class III. .	,, 1330 ,, .	= 380 ,,

Class II. contains cows and heifers whose yields fall between these limits and were not considered worth recording in the report. The Register for 1918 Class I. records contains nearly 5000 animals which completed their lactation on or before 31st December 1918, and calved again before 1st May 1919.

By bringing milk-yields to the estimated equivalents in milk of 1 per cent. fat, 600 gallons of milk containing 4·08 per cent. is approximately equivalent to 700 gallons with a fat content of 3·5 per cent. of fat.

SIXTY HIGHEST MILK YIELDS PRODUCED IN 1919, OF ALL THE COWS WHICH PRODUCED ANOTHER CALF IN NOT MORE THAN THIRTEEN MONTHS FROM THE DATE OF CALVING PRECEDING OPENING OF RECORD.

Farm.	Name of Cow.	*Herd Book* No. of Cow.	Age of Cow at Opening of Record. Years.	Total Milk in Gallons.	Per cent. of Fat.	Total Milk of 1 per cent. of Fat in Gallons.	Weeks in Milk.	Date of Calving preceding Opening of Record.	Due Date of next Calving after Record closed.	Daily Yield in lb. at last test, if over 9 lb.
Brieryside . .	"Marwhirn Sypland 2nd" .	A 695	11	1316	3·92	5153	47	14th Jan. 1919	12th Feb. 1920	14·0
Bargenoch . .	"Bargenoch Tango" . .	51659	4	961	5·06	4864	42	15th Jan. 1919	22nd Jan. 1920	10·0
" . .	"Bargenoch May Blossom 3rd"	36990	6	1005	4·78	4808	46	15th Feb. 1919	14th Feb. 1920	...
Barcheskie . .	"Cumstoun Whitie 4th" . .	A 1421	7	1268	3·74	4747	37	5th April 1919	18th Mar. 1920	10·5
Westburn . .	"Netherhall Brownie 25th" .	47694	5	1219	3·81	4646	45	4th Mar. 1919	27th Feb. 1920	19·5
Glenshamrock .	"Glenshamrock Ellen" . .	37144	7	1100	4·19	4612	46	19th Feb. 1919	12th Feb. 1920	11·5
Thornhill . .	"Harelaw Alexis 4th" . .	33849	7	1112	4·13	4596	41	11th Mar. 1919	29th Feb. 1920	13·5
Craigbet . .	"Purroch Gipsy" . .	19004	5	1281	3·59	4592	35	5th May 1919	30th May 1920	40·5
Willoxton . .	"Willoxton Blossom 6th" .	40578	8	1141	4·01	4571	43	26th Nov. 1918	16th Dec. 1919	15·5
South Craig . .	"South Craig Lady Blossom"	36960	6	1036	4·41	4570	35	7th May 1919	19th May 1920	26·5
Corsehill . .	"Corsehill Blackie" . .	...	8	1123	4·05	4557	42	11th May 1918	19th April 1919	27·5
Netherton . .	"Netherton Queen Mattie" .	28638	8	1099	4·14	4551	48	22nd Dec. 1918	21st Jan. 1920	14·0
Boghead . .	"Boghead Mary 3rd" . .	30614	9	961	4·73	4544	47	4th Feb. 1919	10th Jan. 1920	11·5
Smithston . .	"Smithston Daisy" . .	B 2395	6	1092	4·16	4540	45	19th Dec. 1918	15th Dec. 1919	...
Cowhill Home Farm	......	...	8	995	4·56	4534	45	26th Feb. 1919	2nd Feb. 1920	18·5
Smithston . .	"Smithston Flora" . . .	B 1524	9	1121	4·02	4511	46	14th Oct. 1918	21st Oct. 1919	12·0
Drumfork . .	"Drumfork Daisy 5th" . .	A 2969	7	1245	3·61	4492	45	8th Feb. 1919	5th Mar. 1920	18·0
Hillhouse . .	"Glassock Teenie 3rd" . .	A 2259	...	1027	4·37	4491	50	9th Nov. 1918	21st Oct. 1919	16·5
Genoch . . .	......	...	6	1067	4·21	4489	30	27th May 1919	5th April 1920	24·0
Knockdon . .	"Knockdon Bessie Lee" .	28789	8	1080	4·14	4472	34	29th Mar. 1919	29th April 1920	11·5
South Craig . .	"South Craig Betty 2nd" .	52004	4	1123	3·97	4459	40	6th Jan. 1919	18th Jan. 1920	23·5
Bargenoch . .	"Bargenoch Hope 2nd" . .	29774	8	1103	4·04	4452	40	7th Jan. 1919	13th Jan. 1920	10·5
Halldykes . .	"Halldykes Barbara" . .	...	5	1141	3·89	4442	44	15th June 1918	5th May 1919	13·5
Mainhill . .	"Mainhill Lizzie" . . .	A 3566	6	1127	3·94	4439	45	12th July 1918	5th Aug. 1919	10·0

Craigbet.	"Purroch Beauty 3rd"	18992	5	1222	3·53	4435	41	21st Mar. 1919	11th Mar. 1920	26·5
Mid Buiston	"Mid Buiston Darling"	42770	5	1085	4·06	4406	43	22nd Feb. 1919	17th Mar. 1920	17·0
South Craig	"South Craig Betty"	33842	8	1119	3·93	4394	35	10th Feb. 1919	27th Jan. 1920	22·0
Mainhill.	"Mainhill Princess 2nd"	A 6993	5	1068	4·09	4369	40	18th Mar. 1919	20th Mar. 1920	20·5
Juniperbank	"Shawsmuir Nell 2nd"	35162	8	1137	3·84	4369	50	16th Jan. 1919	2nd Feb. 1920	22·5
Mainhill.	"Mainhill Rachael"	...	5	1114	3·92	4363	42	12th April 1918	3rd May 1919	...
Lane	"Lane Heatherbell"	31615	9	953	4·58	4362	42	2nd Mar. 1919	26th Feb. 1920	...
Kilmaurs Mains	"Kilmaurs Mains Queen 2nd"	...	8	1192	3·65	4362	43	24th Feb. 1919	24th Feb. 1920	13·5
Mid Buiston	"Mid Buiston Spottie 2nd"	51602	9	1064	4·10	4358	39	21st Mar. 1919	10th April 1920	23·5
Auchinbay	"Auchinbay Mina 2nd"	41312	8	1012	4·30	4356	45	27th Feb. 1919	16th Feb. 1920	22·0
South Craig	"South Craig Snowwreath"	36969	8	1062	4·05	4299	40	17th Feb. 1919	7th Mar. 1920	13·0
Bargower	"Bargower Sunrise 3rd"	37201	...	1005	4·27	4296	45	26th Dec. 1918	10th Jan. 1920	17·5
Hobsland	"Hobsland May 3rd"	37825	6	1054	4·07	4294	43	16th Feb. 1919	11th Mar. 1920	12·0
Genoch	......	...	4	965	4·45	4294	45	8th Dec. 1918	27th Nov. 1919	...
Whiteside	"Whiteside Gay Lass 2nd"	38280	7	1075	3·99	4288	50	7th Oct. 1918	22nd Oct. 1919	...
Crosslet	"Crosslet Daisy 2nd"	...	7	1166	3·67	4276	48	29th Oct. 1918	11th Nov. 1919	...
Sandhill	"Sandhill Soncie Queen"	49173	5	957	4·46	4270	40	17th Mar. 1919	3rd Mar. 1920	19·0
Auchenbrain	"Auchenbrain Crummie 4th"	34664	7	900	4·73	4257	42	24th Mar. 1919	9th April 1920	15·5
Garclaugh	"Garclaugh Dainty 6th"	40068	7	1047	4·07	4257	46	8th Mar. 1918	30th Mar. 1919	14·5
Smithston	"Smithston Violet 2nd"	A 4439	5	1015	4·17	4233	43	12th Mar. 1919	15th Feb. 1920	22·0
Barr	"Newmains Doll"	47529	5	1020	4·12	4209	44	24th Feb. 1919	3rd Mar. 1920	10·5
Hobsland	"Hobsland Lovely 3rd"	37818	6	949	4·43	4204	43	13th Mar. 1919	25th Mar. 1920	13·0
Netherton	"Langhill Polly"	A 6217	7	952	4·41	4204	49	16th Dec. 1918	1st Jan. 1920	10·0
Nether Craig	"Wardlaw Beauty 5th"	38422	5	1162	3·60	4189	46	28th Sept. 1918	23rd Oct. 1919	20·5
Redhills	"Redhills Primrose 5th"	54385	4	1011	4·14	4185	44	6th Mar. 1919	8th Mar. 1920	13·0
High Tarbeg	"High Tarbeg Mary Ann 3rd"	29389	10	1076	3·88	4173	46	13th Jan. 1919	16th Jan. 1920	...
Gree	"Langdyke Violet"	50738	4	1038	4·01	4161	41	5th Oct. 1918	11th Oct. 1919	29·5
Sandhill	"Sandhill Sarah Pride"	A 4675	8	1070	3·88	4157	41	12th Feb. 1919	22nd Feb. 1920	...
Overton	"Overton May Mischief"	56140	4	992	4·19	4154	40	27th Mar. 1919	12th Mar. 1920	13·0
Netherhall	"Netherhall Katrina"	53923	5	1074	3·87	4152	43	4th Jan. 1919	2nd Feb. 1920	12·5
Hillhouse	"Howie's Bella"	33494	8	1181	3·52	4152	47	20th Feb. 1918	14th Feb. 1919	16·0
Halldykes	"Halldykes Princess"	...	8	1045	3·97	4150	43	14th Mar. 1919	29th Feb. 1920	18·0
Bargenoch	"Bargenoch Eva 2nd"	51648	4	905	4·58	4148	42	4th Feb. 1919	28th Jan. 1920	...
South Craig	"South Craig Sally"	33848	9	1080	3·83	4138	38	9th Mar. 1919	5th Mar. 1920	10·0
Lessnessock	"South Holm Beenie"	A 923	7	1007	4·10	4132	43	26th Feb. 1919	12th Feb. 1920	...
Mossgiel	"Mossgiel Teenie"	A 5264	5	1069	3·86	4130	44	7th Dec. 1918	7th Jan. 1920	11·5

The following **table of the Fenwick (High) Milk Record Society**, which has been in operation since 1905, refers to cows and heifers, 715 in number, calving at all periods of the year, to produce milk for direct sale. The recorder visited each farm represented by letter A, B, C, etc., at intervals of twenty-two days, all the year round. Sixty per cent. of the cows and heifers tested were put in Class I. and 1 per cent. in Class III.:—

Farm.	Cows and Heifers.				
	Number.			Per cent.	
	Total.	Class I.	Class III.	Class I.	Class III.
A	40	17	...	43	...
B	40	25	...	63	...
C	26	12	...	46	...
D	34	24	...	71	...
E	22	17	...	77	...
F	29	16	1	55	3
G	44	40	...	91	...
H	30	14	...	47	...
I	59	29	...	49	...
J	46	26	...	57	...
K	25	24	...	96	...
L	41	31	...	70	...
M	34	13	2	38	6
N	40	18	3	59	7
O	47	30	...	64	...
P	36	26	...	72	...
Q	33	16	...	48	...
R	29	15	...	52	...
S	57	32	2	56	3

Ayrshire bullocks feed well after they are three years old, and so do crosses with the Shorthorn bull even at an earlier age, and produce excellent beef; but Ayrshire steers are not often met with, as the bull calves are usually sold for a few shillings as "slinks" (newly born calves), and killed when a day or two old. Many are never allowed to drink milk, but are killed immediately after birth, and sent for consumption into the large centres of population. Two-year-olds, steers, and queys are hardy, and will winter well at little cost in a sheltered place in the open air if provided with 2 or 3 lb. each of undecorticated cotton-cake per day, and a handful of hay when snow covers the ground or during a prolonged period of hard frost. An equivalent in food values of dried brewer's grains is a satisfactory substitute when hay is not available.

The cross-bred **Ayrshire Galloway** is very hardy, but a slower maturity animal than the Ayrshire-Shorthorn cross. It is in greater favour both as a milking and as a grazing animal, now that young cattle are better attended to and not left so much to their own resources as in olden time. A check to crossing is the fact that giving birth to the larger calf by a Shorthorn bull is liable to break down an Ayrshire dairy cow prematurely, and prevent her yielding her normal flow of milk. The Ayrshire-Polled-Angus cross, although not subject to the same objection, is not a general success. It requires more milk than the pure Ayrshire calf, more than a dairy farm can spare; and most strains of Angus cattle do not nick well with thin-fleshed kine like the Ayrshire.

American and Canadian settlers from this country took Ayrshire cattle with them, and others imported them, to form ultimately the foundation stock of dairy cattle in many centres on the **other side of the Atlantic**. In Canada the Ayrshire Importers' and Breeders' Association was formed in 1885 on the remains of an earlier institution started in 1870. In 1920 it claimed a membership of 1754 and the last volume of the *Herd Book* recorded a total of 4843 pedigrees. It is further estimated that Ayrshires in Canada number 55,000 to 60,000. Similar Societies have been established in the United States, Australia, New Zealand, South Africa, Sweden, Finland, and Japan. In U.S.A. the Ayrshire Breeders' Association was organised in 1875 and 37 volumes of their *Herd Book* were issued up to 1919, the last registering 1363 bulls and 3889 cows.

The Swedish Government have been large and steady importers of Ayrshires of the best milking types—many of them bought at very small prices. It is now the most numerous and most important dairy breed in that country, and there its characteristic points and its merits are thoroughly understood and appreciated. The Swedes were ahead of most other countries in discovering its merits.

RECORDS FOR 1915-1916 OF SWEDISH AYRSHIRE CATTLE.

Name of the Herd.			Average Number of Cows.	Total Yield per Cow, Lb.	Percentage of Fat.
"Hamra"	by	"Tumba"	151	7432	3·91
"Alberga"	,,	"Albergagard"	126	6716	4·06
"Björka-Saby"	,,	"Björka-Saby"	118	7850	3·91
"Oranas"	,,	"Granna"	42	7515	4·03
"Skärhult"	,,	"Skärhult"	91	6811	4·24
"Hafrekullen"	,,	"Brotjemark"	15	7791	4·04
"Getinge"	,,	"Höstlanda"	17	8764	3·90
"Ahult"	,,	"Lannaskedebrunn"	22	7881	3·97
"Kyrkeryd"	,,	"Smalands Rydaholm"	6	8674	3·94
"Ugglehult"	,,	"Lamhult"	9	9830	4·12

Within recent years a good many Ayrshire bulls have been sent to India to the Military Farms, to cross with native milch cows. The first cross more than doubles the yield of the native cow's milk, but, as the progeny are more liable to contract and succumb to rinderpest, greater care has to be taken to keep them away from native animals that have been in contact with the disease, and to attend to the maintenance of the standard of excellence and purity by pedigree registration and other means.

In Argentina, Ayrshires find little or no favour in competition with Shorthorns. They are too thinly built, like the native cattle of the River Plate. The chief dairy cattle of our Australasian possessions are the Shorthorns, the Ayrshires, and their crosses formed by the alternate use of pure bulls of the two breeds on the common milking cows. The conditions of South Africa invite a greater number of Ayrshire cattle than are there now, of dark colour of hair and underlying skin. The skins of white or light Ayrshires are liable to burn and blister with the sun during bright weather, even in this country, and the animals give unsatisfactory results in consequence. As in some Channel Islands cows, the white hair and light skin do not correspond, but the dark skin extends under the white hair for an inch more or less. The areas, which are at times extensive, are easily recognised during the heat of summer by the dark colour shining through the thin coat of white hair and by the hair lying smoothly, while that on the fair and sunburnt surface stands up like a coat "staring" from cold.

The following is a list of names of **important breeders of Ayrshire cattle**:—

Mrs Adamson, Harleyholm, Thankerton; A. Y. Allan, Aitkenbar, Dumbarton; The Misses Allan, Beuchan, Thornhill; A. M. Baird, Garclaugh, New Cumnock; Thos. Barr, Hobsland, Monkton; T. and A. Clement of Netherton, Newton-Mearns; Hon. G. Corbett, Rowallan, Kilmarnock; H. W. B. Crawford, Chapmanton, Castle Douglas; Mrs Houison-Craufurd, Dunlop House, Dunlop; Alex. Cross,[1] Knockdon, Maybole; A. Cunningham, Cragston, Stewarton; R. and D. Dickie, Knockenjig, Sanquhar; Dr C. Douglas, Auchlochan, Lesmahagow; John Drennan, Hillhouse, Galston; C. R. Dudgeon, Cargenholm, Dumfries; W. T. Dunlop, Gree, Fenwick; The Right Hon. the Earl of Eglinton, Eglinton Castle, Irvine; James S. Ferguson, Auchinbay, Ochiltree; W. T. R. Houldsworth, Threave, Kirkmichael; Wm. Howie, Brieryside, Monkton; James Howie, Hillhouse, Kilmarnock; A. Fingland Jack, Stockfield Hall Farm, Stockfield-on-Tyne; Major Keswick, Cowhill, Holywood; Thos. Lindsay, Aitkenbrae, Monkton; Wm. Lindsay, Carsegowan, Wigtown; A. Logan, Overton, Drongan; J. Logan, Bargenoch, Coylton; T. Logan, Low Milton, Maybole; W. Logan, South Craig, Hollybush; J. Mackie, Dalfibble, Dumfries; Wm. D. M'Cubbin, Lochlands, Maybole; R. M'Kinlay, Hillhouse, Lanark; A. W. Montgomerie, Lessnessock, Ochiltree; Jacob Murray, Dalgig, Cumnock; John Murray, Kilfillan,

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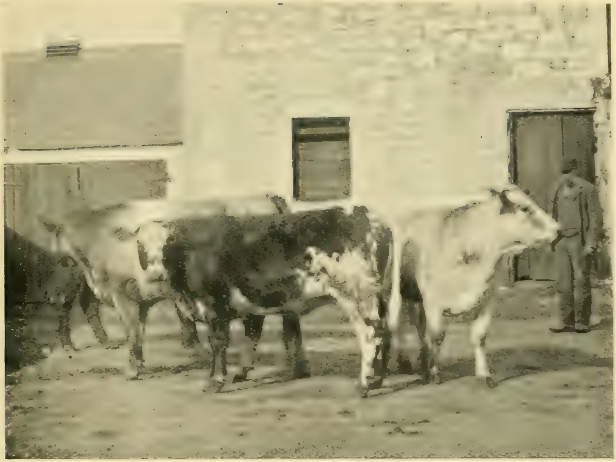
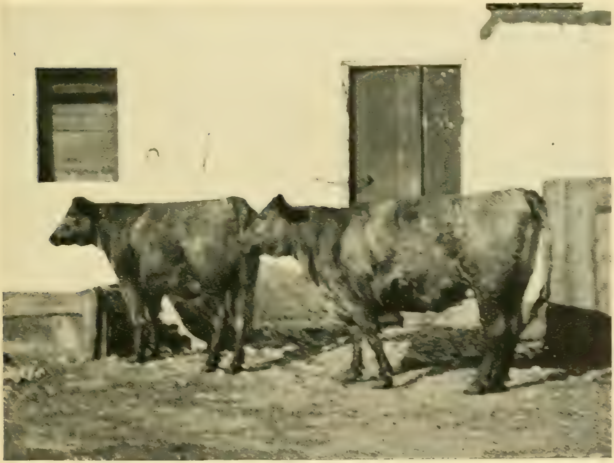
[1] Died 1921.



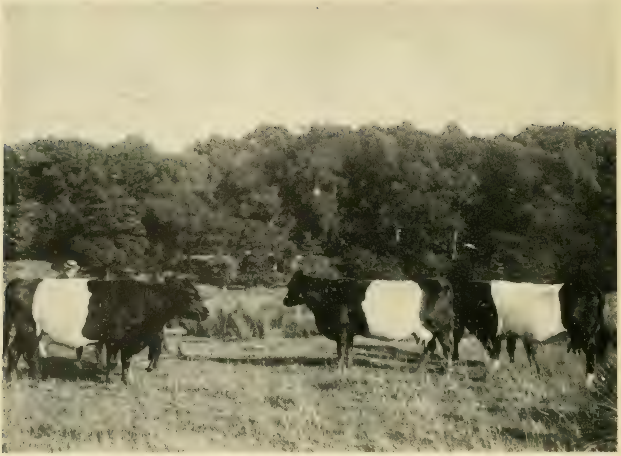
1. 2. 3. 4.

A. BLUE-GREY SHORTHORN CROSSES BY A GALLOWAY BULL, Nos. 1, 2, and 4.
No. 3 (Heifer), second cross by Galloway bull on Aberdeen-Angus cross.
No. 4 (Heifer) was Champion at Hetherington's Mart, Carlisle Christmas Show, in 1900.
All 1st prize cattle.

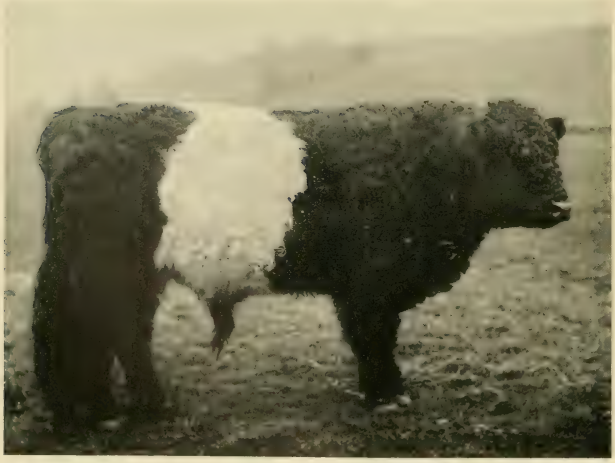


1. 2.

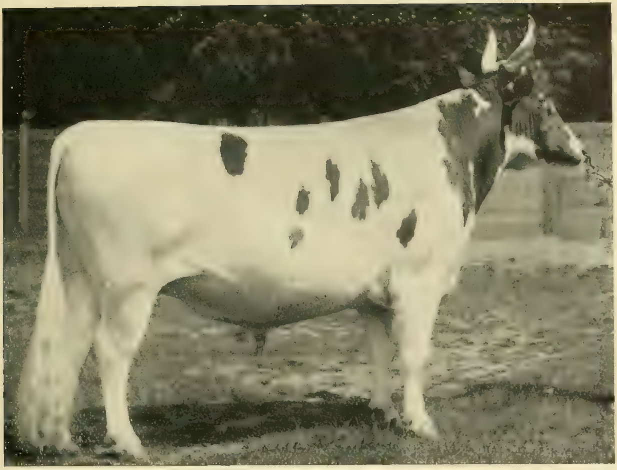
B. GALLOWAY SHORTHORN HEIFERS.
Won at Dumfries in 1902. No. 1 also at the Carlisle, Royal, and three principal English Shows.
All exhibited by Wm. Kennedy, Luce Mains, Ecclefechan.



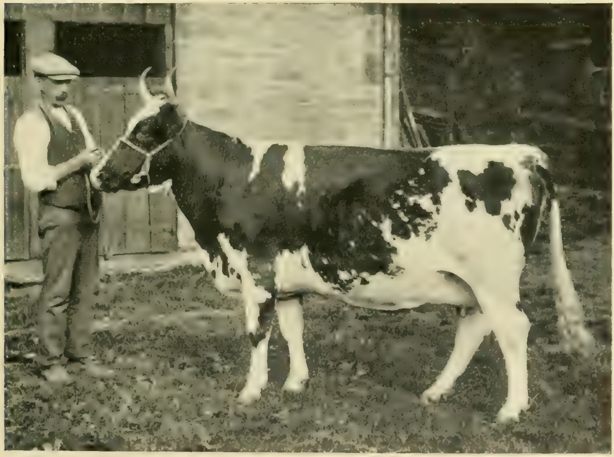
A. White-Belted Galloway Milch Cows.
The property of Hon. F. Bowes Lyon, Ridley Hall, Bardon Mill, R.S.O., Northumberland.



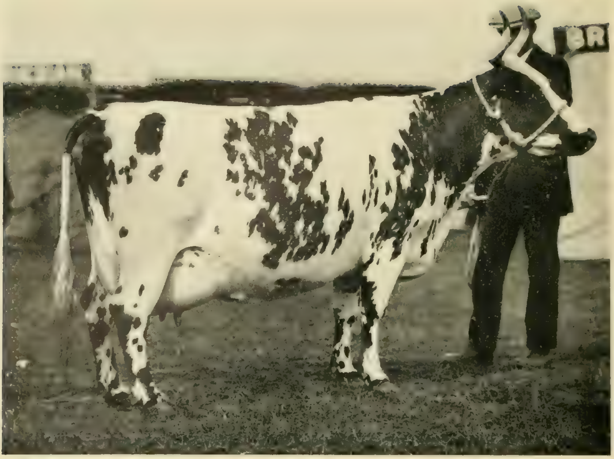
B. Belted Galloway Bull from Knockbrex.



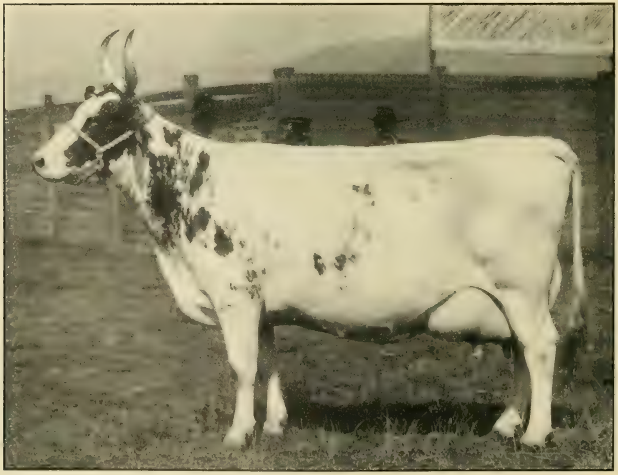
A. AYRSHIRE BULL, "DARBOIGH DIGNITY" (14806).
Bred by A. Watson. Owned by W. Murray Kirkland, Closeburn.
Unbroken show record super breed champion, Highland and Agric. Society's Show, 1919.
Dam's milk record (7 lactations) 900 galls.; 4·13 per cent. fat, in 42 weeks.
[*C. Reid, Wishaw.*



B. AYRSHIRE COW, "MONA" (55727).
Champion female of Ayrshire breed, Highland and Agric. Society's Show, Edinburgh, 1919.
Milk record, 6 lactations running, 1088 galls., 3·70 per cent. fat, in 41 weeks.
[*C. Reid, Wishaw.*

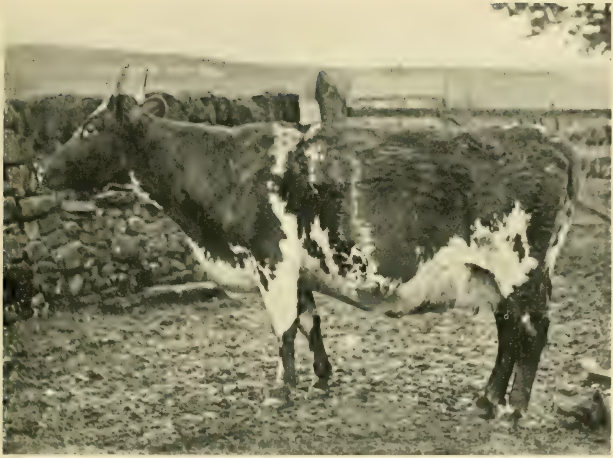


A. Ayrshire Cow, “Carston Cinderella.”
First prize-winner 1922. Owned by J. S. Murray.
[“*Agricultural Gazette Photograph.*”



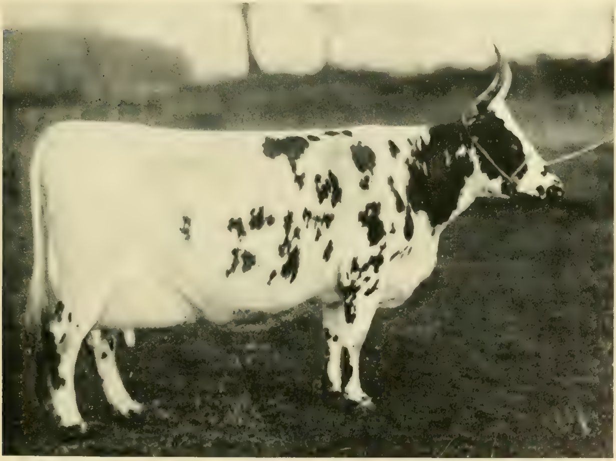
B. Ayrshire Cow, “Lochdougan Princess 3rd” (A 6872). 6 years and 4 months.
President’s Medal at Stirling Highland Show, 1921.
Shown by A. W. Montgomery, Lessnessock, Ochiltree.
Bred by T. Douglas, Lochdougan, Castle-Douglas.

PLATE LXV.



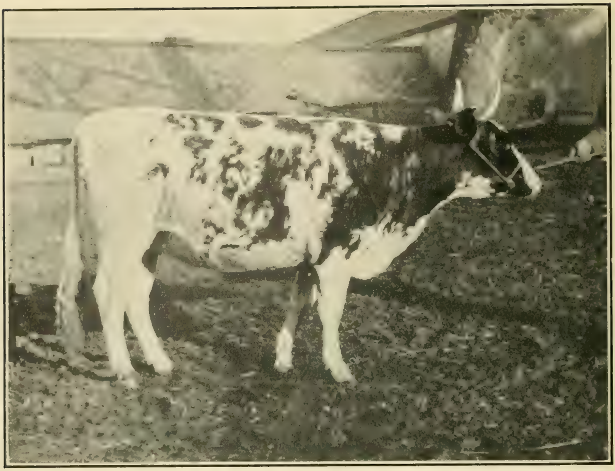
A. AYRSHIRE COW (registered).

By a half brother she produced a splendid milch cow which only developed loose scurs after 3 years.
Bred by J. Moffat, Gateside, Sanquhar.



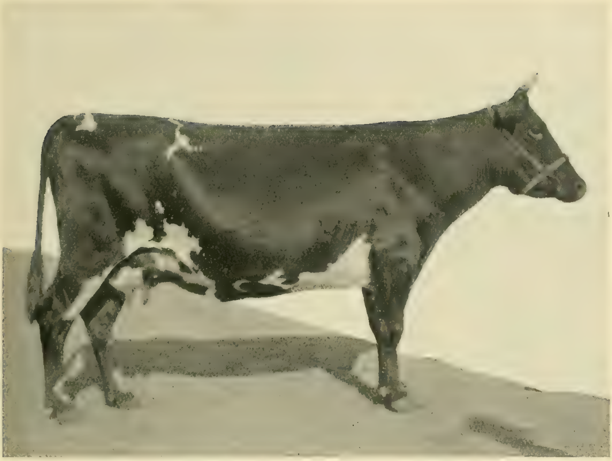
B. AYRSHIRE COW, "MARWHIRN SYPLAN 2ND."
Bred by David Gray, Marwhirn, Moniaive, Dumfriesshire.
Milk record 1917—1160 galls., 3·47 per cent. butter-fat in 48 weeks.
,, 1918—1561 ,, 3·56 ,, ,, 51 ,,
,, 1919 1316 ,, 3·92 ,, ,, 47 ,,

[*Brown & Co., Lanark.*

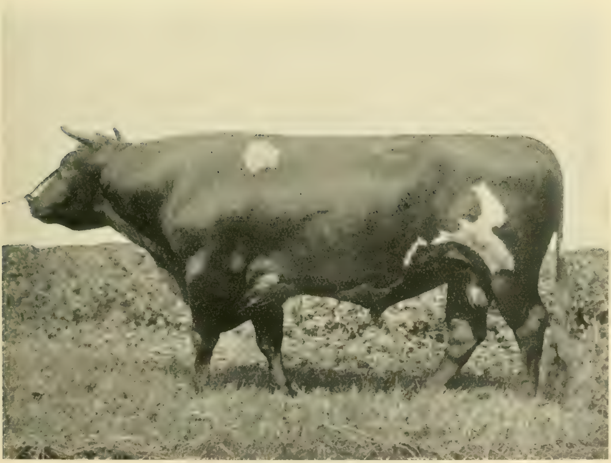


A. AYRSHIRE COW,
from the tuberculous-freed dairy, sold at a record price by J. R. W. Wallace, at Auchenbainzie.
(See page 340.)

B. AYRSHIRE COW, "AUCHENBRACK JENNY LIND" (15126).
In the third week after calving, October 1906, gave 55 lb. of milk daily, yielding 4·3 per cent. fat, producing 16 lb. of butter. Bred by J. R. W. Wallace, Auchenbrack, Thornhill, Dumfriesshire.

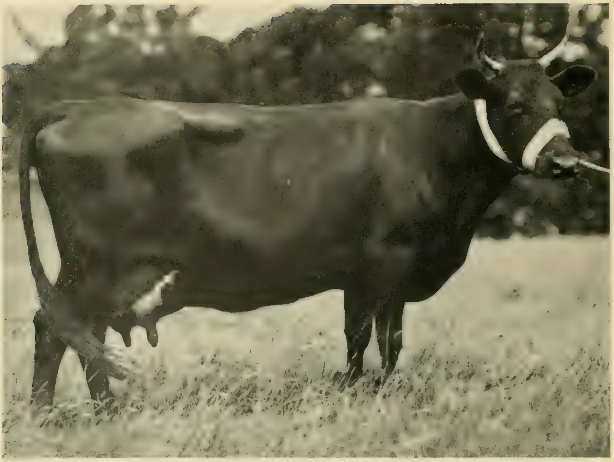


A. SWEDISH AYRSHIRE COW, "217 GRETA, 7TH OF ARANAS" (A.F. 7693).
Bred by C. G. Wernan; 1917 yield 9322 lb. milk 4·25 per cent. fat.



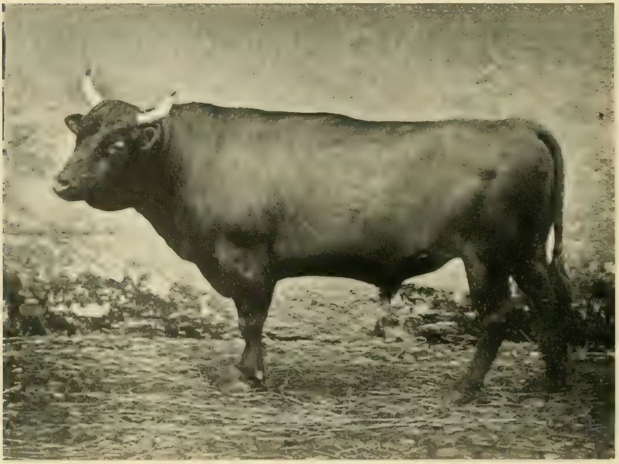
B. SWEDISH AYRSHIRE BULL, "THE PRINCE, 24TH OF ARANAS" (A.F. 2058).
Yield of dam 12,159 lb. milk, 4·07 per cent. fat; grand-dam, 9916 lb. milk, 4·01 per cent. fat.

PLATE LXVIII.

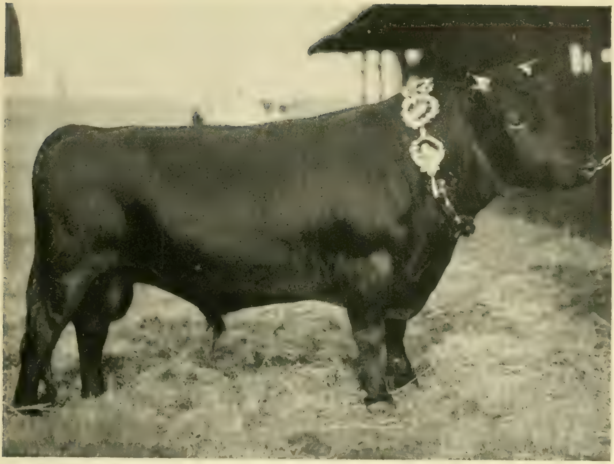


A. KERRY COW, "MINLEY MISTRESS."
Owned by Captain Nelson Zanbra.
Calved 1908; first at Tring, 1921, first at Darlington Royal.

["*Agricultural Gazette Photograph.*"

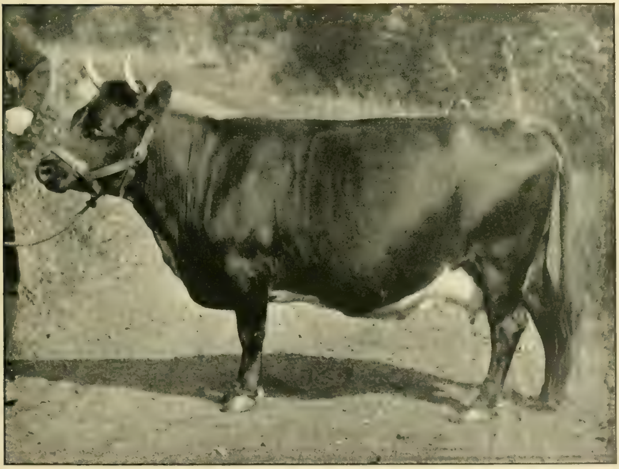


B. KERRY BULL, "PADDY BLAKE,"
which was the property of the late Lord Clonmell.



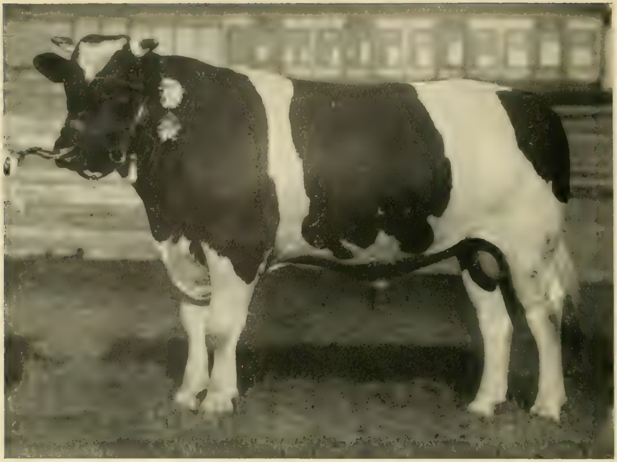
A. DEXTER BULL, "DOWNFORD DANDY."
First and champion at the English Royal for three successive years.
Owned by H. G. Jones.

[*"Agricultural Gazette Photograph."*

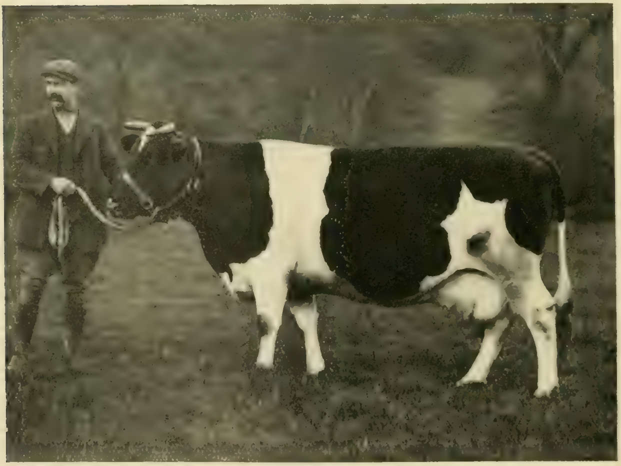


B. DEXTER COW, "IRISINE."
Many prizes in Ireland and England, including first at London Dairy Show in 1886.
Owned by the late Martin J. Sutton, Reading.

[*Victor White, Reading.*



A. British Friesian Bull, "Kingswood Ynte Series."
Reserve Champion at Cambridge Royal, 1922.
[*"Agricultural Gazette Photograph."*



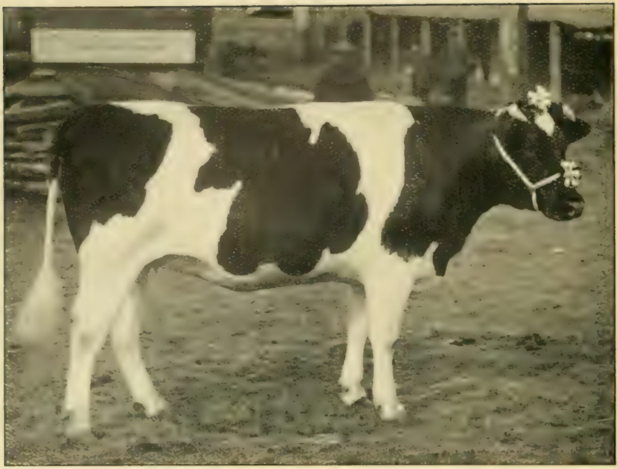
B. British Friesian Cow, "Moordale Meibloem" (Imported).
Owned by G. Holt Thomas. First at the Dairy Show, 1919.
[*"Agricultural Gazette Photograph."*

PLATE LXXI.

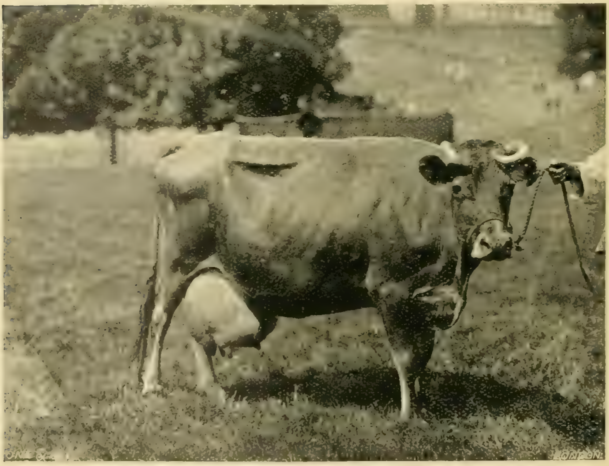
A. American Friesian, "Segis Pietertje Prospect.
The 1922 world's champion record of 37,381·4 lb. milk in 365 days—nearly 12 gallons per day; butter 1448·68 lb. in 365 days (see page 324).

B. Canadian Friesian, "Johanna Jemima Posch," Riverside, Canada.
Once the World's Champion with records of 26,415 lb. of milk, yielding 1215 lb. butter in 365 days, and 672·9 lb. milk, with 31·94 lb. butter in 7 days.

PLATE LXXII.



A. British Friesian Heifer, "Lochlands Pel Naspa" (40376), 2 years 4 months.
President's Medal for best Friesian, Stirling Highland, 1921.
The Trustees of A. W. M'Robert, Dounside, Tarland, Aberdeen. Bred by Adam Smith.



B. Channel Islands (Cross-Bred) Cow, "Doctor," at 24 years old.
Many prizes, including the Lord Mayor's Cup in 1905 at the London Dairy Show.
Last owner Captain J. Smith Neill, Wendover Lodge, Wendover, S.O. (see page 235).

Glenluce; Herbert Murray, Stocksfield Hall Farm, Stocksfield-on-Tyne; Wm. Murray, Kirkland, Closeburn; James Neil, Barleith, Hurlford; R. Osborne, Morton Mains, Thornhill; Robert Paton, Mains of Aires, Stranraer; Thomas Scott, Netherhall, Lanark; James Seton, Shewalton Mains, Irvine; John Slater, Grange, Kirkcudbright; R. and J. Smith, Whitehill, Ochiltree; Sir Hugh Shaw-Stewart, of Ardgowan, Greenock; Sir Mark J. M'Taggart-Stewart of Southwick, Dumfries; D. Wallace, Auchenbrain, Mauchline; Alex. Watson Barboigh, Mauchline; J. N. Watson, Cawhillan, Ochiltree; W. Watson, High Barbeg, Ochiltree; Weir, Townfoot, Thornhill; A. Wilson, Finelayston, Ochiltree; Sir David Wilson, Bart., D.S.C., of Carbeth, Killearn; H. C. Winter, Drumsuie, Drongan; H. Young, Redhills, Dumfries.

The attempted development of a **Polled dual-purpose** sub-breed of Ayrshire type was begun by George Wills, Manager, Crichton Royal Asylum Farm, Dumfries, in 1912, when a Red Poll bull, costing £25, delivered from the Sudburn Hall herd with an average 800-gallon record, was mated to a few selected heavy milking Ayrshire cows. Owing to the tendency of the cross to produce a larger proportion of bulls than heifers, and to other mishaps, only one good slightly brindled cow was at first produced. Her dam had a record average of 800 gallons for eight years, and bore nine calves up to January 1919.

One female of the desired type has so far been produced, and that a magnificent polled second cross with a broken red and white colour, which died as a result of the attempt to give birth to an exceptionally large calf.

Other breeders, both in Dumfriesshire, of the new Ayrshire-Red-Poll cross, are Major Carruthers, Dormont, Ruthwell; and Major Keswick, Cowhill Tower, Holywood.

The general experience has been that the first crosses are red in almost every instance, with white underline patches and occasional white feet, and the heifers polled, while a great many of the bulls show scurs in place of horns.

In the second crosses from half-bred parents, the desired broken red and white Ayrshire colours appear.

It is impossible to foretell what may be the final result of the experiment, but apart from a fairly promising milk record, which has so far not exceeded that of the parent breeds, the cows have the characteristic docility and robustness of constitution of heavy milkers, and, owing to greater weight and strength, are not molested by the more pugnacious Ayrshires which graze with them. The bullocks feed easily but normally to medium weights.

The predominating cattle of Ireland are Shorthorns, the blood of which has been more or less mingled with that of the most numerously represented of the ancient Irish breeds, the Longhorn. The last three or four decades have seen an enormous improvement in the feeding qualities of the general run of Irish grazers, brought over in large numbers, and sold at fairs and markets in both Scotland and England.

Number of Cattle sent from Ireland to England and Scotland respectively, 1915 to 1922.

	England and Wales.	Scotland.
1915	556,211	284,524
1916	587,419	301,637
1917	621,001	267,595
1918	480,870	238,925
1919	521,281	243,035
1920	605,975	319,951
1921	536,299	231,191
1922*	375,482	146,456

* Eight months ending 31st August.

The Kerry is "the poor man's" or the Irish cottar's cow, especially in cold and inferior districts, and is noted for docility and as a family pet. Pedigree herds exist in many parts of the British Empire, but it is only on the Berehaven Peninsula in County Cork, and in the mountainous parts of County Kerry, that the breed is now (1920) to be found as commercial cattle reared and kept on practically all the holdings.

The Kerry bears evidence of great antiquity, although the history is not traceable much further back than the middle of the eighteenth century. It is practically the only surviving pure breed of cattle of some four or five breeds which Ireland possessed not very long ago. One has already been referred to at p. 180. Sir William R. Wilde,[1] as a result of osteological researches in connection with the remains of oxen found in Irish bogs, showed that "four breeds or races of cattle existed in Ireland in early times—the straight-horned, the curved- or middle-horned, the short-horned, and the hornless 'Maol' or 'Moyle.'" The last has been all but lost among the cross-bred cattle which form the chief Irish herds of the present time. The polled condition which at times appears is as likely to have originated from Scotch polled bulls (of which a good number have been used, especially in the North), as from the Irish prototype. Wilde says, that "so far back as the eighth or tenth century we had in Ireland a breed of cattle which, for beauty of head and shortness of horn, might vie with some of the best modern improved races so much admired by stock-masters, and which are now being reintroduced from England." That breed is extinct. The Longhorn, still represented by a few herds, seems to have been a more recent introduction; but the curved- or middle-horned variety is represented in the Kerry and Dexter of the present day. The accounts of Kerry cattle by Low and Youatt are rather contradictory, and a little confusing; but two articles in the *Royal Agricultural Society's Journal*, dated 1872 and 1898, and Pringle's chapter in Coleman's *Cattle of Great Britain*, deal interestingly with the subject.

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[1] "On the Ancient and Modern Races of Oxen in Ireland," read at a meeting of the Royal Irish Academy, and quoted by Pringle.

"**The true Kerry** 'the thoroughbred of Irish cattle,' is (1872) a light, neat, active animal, with fine and rather long limbs, narrow rump, fine small head, lively projecting eye, full of fire and animation, with a fine [waxy yellow or] white cocked horn tipped with black, and in colour either black or red." The latter colour is not eligible for entering by inspection in the *English Herd Book.*

Kerries first appeared at the Spring Show of the Royal Dublin Society in 1844, but a separate class for Dexters was not established till 1876. The *Dublin Farmers' Gazette* published the first "**Register of Pure Kerry Cattle and Dexters**" in 1887.

After the issue of three volumes it was taken over by the Royal Dublin Society, who published Vol. I. of the existing *Irish Herd Book* in 1890. This contained the entry of 118 Kerry bulls and 943 Kerry cows. All animals entered in the first, second, and third issues of the Kerry Register were accepted as the basis of the *Herd Book.* The number given to each animal in the Register was adopted as the *Herd Book* number.

"The Royal Dublin Society carried out a series of annual inspections to qualify foundation stock up to the year 1900, when the *Herd Book* was closed to bulls other than pedigree animals and those with a certain number of crosses of sires already entered in the *Herd Book.* No females could be entered by inspection after 1904, when the *Herd Book* was closed finally to all animals other than those with pedigree qualifications." Up to 1904 the following entries were recorded: 492 Kerry bulls and 3336 Kerry cows, a large proportion of which had been qualified for entry by pedigrees in many cases tracing back to the earliest volumes of the *Herd Book.* The total entries now (1920) comprise 909 Kerry bulls and 4268 Kerry cows.

New Society formed.—A meeting of Kerry and Dexter cattle breeders was called at the Lake Hotel, Killarney, on 14th July 1917, to consider the proposal of forming an Association to promote the interests of Kerry and Dexter cattle breeding in Ireland.

Rules and bye-laws were approved, and the following officers appointed for the year 1917-18:—

President, Stephen Brown, Ard Caein, Naas. *Vice-President*, D. M. Rattray, Ballybunion, Co. Kerry. *Committee*, Mrs Robertson, Dogleap, Limavady; R. E. Chute, Le Brook House, Tralee; John Hilliard, Lake Hotel, Killarney; John C. M'Kay, Beaufort, Killarney; John Neill, Aghadoe, Killarney; Captain Benn, Millstreet, Co. Cork; Lord Frederick Fitzgerald, Maynooth. *Hon. Secretary and Treasurer*, Robert Heggie, Valencia Island, Co. Kerry.

At **the Annual General Meeting** of the Society held in the Board Room of the Royal Dublin Society on 11th June 1919, it was decided to **change the name** to **The Kerry Cattle Society of Ireland.** This alteration was deemed advisable as herds of pedigree Dexter cattle have practically ceased to exist in Ireland owing to the difficulty of breeding these cattle pure. It is the experience of Irish breeders that when Dexter cows are mated with a Dexter bull a large proportion of the progeny are either still-born or deformed—monstrosities. As a result of constant disappointments owners have gradually given up the attempt at breeding pedigree Dexters and, so far as Irish breeders are concerned, their whole attention is now directed to the development of the Kerry breed, of which there are now many excellent herds in Ireland ranging from ten to fifty head.

Concurrently with this ban upon Dexters in Ireland a boom of Dexters has started in England. A high authority on the subject writes: "At all the leading Shows in England this year (1920) the entries for Dexters far exceed the entries for Kerries. Dexters are especially admired by ladies, and there are several well-known herds in England kept by the leading people. The Angus and Dexter Cross at Smithfield has been for several years the admiration of all."

The Irish Department of Agriculture have arranged to carry out annually on application a regular **inspection of the Kerry herds**; and particulars of the **milk records** for the years 1916, 1917, and 1918 appear in vol. xviii. of the *Kerry Herd Book*.

It must be borne in mind that the yields quoted below were produced on moderate fare; in most herds the cows are fed on roots and hay in winter, and on pasture only during the summer months. The first forty-five weeks after calving constituted the milking period. This is regarded as the most equitable term and is now being adopted elsewhere.

In all, eleven herds, with a total of ninety-two cows were under test. The highest yield was 8550 lb. Twelve cows gave over 7000 lb., twenty-three cows between 6000 lb. and 7000 lb., forty-three cows between 5000 lb. and 6000 lb., fourteen cows between 4500 lb. and 5000 lb. The majority of these last were heifers.

The **butter-fat percentages** are remarkably high.

Eight cows gave over 5 per cent. butter-fat. Sixty-two cows yielded milk containing between 4 per cent. and 5 per cent. butter-fat, and of the ninety-two cows whose records are published only two gave under 3·5 per cent. fat.

Owner.	Number of Cows.	Average Milk Yield, Lb.	Average Percentage of Butter-fat.
John C. M'Kay, Pallas House, Beaufort	15	5377	4·19
John Hilliard, Killarney	5	6174	4·08
Arthur R. Vincent, Muckross Abbey, Killarney	2	5513	4·65
The Knight of Kerry, Valencia Island	13	6267	4·1
Munster Institute, Cork	8	6076	4·04
The Countess of Clanwilliam, Montalto, Ballynahinch, Co. Down	2	6553	3·8
John Neill, Aghadoe Cottage, Killarney	1	7197	3·6
The Hon. Mrs Vandeleur, Cahiracon, Ennis	1	5330	4·5
Mrs E. Robertson, Dogleap, Limavady	16	5495	4·68
Stephen E. Brown, Ard Caein, Naas	9	5909	4·72
The Duke of Leinster, Carton, Maynooth	20	6213	4·22

Taking one particular instance, in a herd of nine cows the average butter-fat was 4·7 per cent. and the average milk yield per cow 5909 lb. The average yield of butter would amount to 324 lb. per cow, which at 2s. 6d. per lb. would realise £40, 10s. The best cow gave 7322 lb. of milk with 5·2 per cent. butter-fat—butter yield of 444 lb. worth £55, 10s., not counting the value of the calf or the skim milk.

In examining the records it will be found that as in the case just mentioned, cows which gave a high yield of milk also had, in most instances, a high percentage of butter-fat. Four of the cows in this herd which gave each over 7000 lb. of milk had the following percentages of butter-fat:—No. (1) 5·2 per cent.; No. (2) 5·0 per cent.; No. (3) 4·5 per cent.; No. (4) 4·4 per cent. Another cow in the same herd gave 4683 lb. of milk with 4·1 per cent. of butter-fat, the lowest percentage given by any animal in this herd. Contrary to popular belief low yielding cows do not always give the richest milk. This is a very important point not generally known.

N.B.—For much of the foregoing new information indebtedness is acknowledged to *A Guide to Herds, belonging to members of the Kerry Cattle Society of Ireland*, 1920.

Kerries have in recent years attracted great attention in England at cattle exhibitions, and have on more than one occasion been publicly taken notice of by Royalty. The late King Edward owned a fine herd of Dexters. After the breed had fully established its reputation not only as showyard celebrities but as ornamental as well as general-purpose animals of high merit, the **English Kerry and Dexter Cattle Society** (of which H.M. the King was the patron and a life member), founded in 1892, and incorporated in 1899, published the first volume of its "**Herd Book**" in 1900. By its regulations "a cross between the Kerry and Dexter is considered a half-breed, and cannot be entered."

The following is a list of a few of the **most prominent breeders** in the English Society, which numbers over 180 members:—

Patron, His Majesty the King; Lt.-Col. The Hon. Ben. Bathurst, Furnace Farm, Cowden, Kent; Miss P. de B. Bowen-Colthurst, Fields Farm, Layer-de-la-Haye, Colchester; Stephen J. Brown, Ard Caein, Naas, Kildare; Sir Clifford Cory, Bart., M.P., Llantarnam, Monmouthshire; Laurence Currie, Minley Manor, Farnborough, Hants; Muriel, Countess De la Warr, Warren Farm, Wimbledon Common, S.W.; Capt. Guy M. Gibbs, Gratwicke Hall, Flax Bourton, Somerset; L. Harrison & Co. Ltd., Coolham, Sussex; John Hilliard, Castle Lough, Killarney, Co. Kerry; Alfred Charles King, Braishfield Manor, Romsey, Hants; Lady Loder, Clock House, Cowfold, Sussex; The Marchioness of Londonderry, Springfield, Oakham, Rutland; Mrs Herbert J. Nutt, Hampton in Arden, Warwickshire; Capt. R. E. Palmer, Oaklands Park, Newdigate, Surrey; Ernest P. Peyton, Woodcote Lodge, Kenilworth; The Rev. R. Lingard Simkin, Durbridge, Redmarley, Glos.; Theo. A. Stephens, Hookstile House, South Godstone, Surrey; Thos. Waite, Warwick Lodge, Redhill, Surrey; Lady Eva Wyndham-Quin, Castletown, Carrick-on-Suir, Ireland; Capt. Nelson Zambra, M.C., and M'C. Williamson Milne, West Tisted Manor, Ropley, Hants.

The Kerry cow in breeding condition should not **weigh** more than 850 to 900 lb., and a breeding bull 1000 lb. live-weight. The Dexter cow and bull should each weigh 100 lb. less respectively.

> "The Kerry and the Dexter are eminently suitable for all classes, and for all soils, excellent milkers, ready fatteners, small feeders, and capable of thriving under adverse circumstances, of good appearance, and with a robust constitution, these qualities render them alike invaluable to the labourer and small occupier of poor soil, as well as to the farmer, or small private householder with a field or two who keeps a couple of cows for family use. It has been aptly said of them that 'they are equally at home on the bare hillside, as on the rich grass of a large demesne.'"—From the *E. K. D. H. B.*

The breed, more especially the Dexter section of it, possesses the power of beef production in an eminent degree, "fattening rapidly on even middling pasture, and their beef is exceedingly fine and well flavoured."

A **record of a typical fat Kerry cow** is given in 1872 by Pringle as: "38 in. in height at the shoulder, 70 in. in girth, and 42 in. in length from the top of the shoulder to the tail-head, and a weight of about 30 imperial stones"; and he adds, "the average daily yield of milk of a Kerry cow, properly fed and attended to, is 3 gallons—a quantity capable of producing 6 lb. to 7 lb. of butter weekly."

During the first years of this century **Richard Stratton** "proved beyond a doubt that the first cross between the Kerry and Shorthorn has exceptional qualities as a beef-producer," and the lesson might with advantage be learned by farmers in high cold districts of this country in the rearing of grazing cattle of superior quality to meet the growing scarcity of recent years. The first calf might be by a Polled Angus and the second by a Shorthorn bull. Kerry heifers of the common type from the hills in the south-west of Ireland were introduced to Stratton's Cotswold hill farms and mated with "a white Shorthorn bull of decidedly beef-making propensities." The heifers "were allowed to run over the hill farms and, after calving, they reared their calves among the heather, gorse, and bracken until November when they were weaned. The calves were then shut into a yard and fed on hay and roots and a little linseed meal, enough to keep them in store or healthy condition till April when they were turned out to graze on better land till December. They were easily finished in June at two years and three months old at the very satisfactory price for that period of £17 each."

James Long reported:—

> "The **records** of the **milking trials** of the British Dairy Farmers at **Islington** show that one year eight Kerries averaged 36 lb. of milk daily, containing 3⅓ per cent. of butter-fat. Another year twelve Kerries gave 25½ lb. of milk, with 4⅓ per cent. of fat, and other solids amounting to 9·2 per cent. A third year's average was 33½ lb. milk, 3·69 per cent. of fat. Throughout, the Kerries averaged over 3 gallons of milk per

day, while in three different years thirty-two cows gave milk with 4¼ per cent. of fat. From the La Mancha herd many cows have been sold which have yielded 20 to 22 quarts per day.

"**Milk records** kept of an Irish herd for thirteen years show that the average yield of the herd was over 600 gallons with 4 per cent. butter-fat. There are genuine cases on record of 900 gallons, but the usual yield is from 500 to 700 gallons per annum."

The typical Kerry cow, "Kilmorna Waterville 1st" (3104 R.D.S.), born 1900 and bought Autumn 1912 by T. Waite, Warwick Lodge, Redhill, Surrey, is worthy of special notice owing to her combining exceptional milking qualities with an unsurpassed breed type. She won first at Tralee as a heifer, but nothing is known of her milking career till 1913. In 1913 she won first at the Oxfordshire Show, and first Milking Yield, R.A.S.E. Show, Bristol, and reserve for inspection; in 1914 first Cup, R.A.S.E. Show, Shrewsbury, for inspection; and third Milking Trials (not having been dry since her previous calf, which was dropped 21st February 1913); first at the Bath and West at Swansea; and second, Royal Counties, Portsmouth. These are the only times she has been shown.

Her annual **milk record of continuous milking** from 21st February 1913, and after the birth of her last calf on 20th March 1914, was as follows:—

	lb.
1913 to 31st December	11,126
1914[1] „	8,405
1915 „ „	6,777
1916 „ „	7,842
1917 to 31st December	5205
1918 „ „	4698
1919 „ „	3585
1920 (1st Jan. to 11th Sept.)	3092

After calving in 1913 and 1914 the daily yield was 5¼ gallons for several months. Except in 1913-14 before the Shows, when she got bran and oats in addition to grass, she has had no special feeding.

"Kilmorna Waterville 1st," before her prolonged period of rest from calf-bearing, bred several good bull calves—including "Shamrock Brian Boroihm" (332), the sire of "Shamrock Brian Sheen" (351), winner of first and Phœnix Cup at the Royal Dublin Show, and first prize and Challenge Cup at the R.A.S.E. Show, Nottingham, 1913.

The names of two cows that will live in the history of the breed as great milkers are C. R. W. Adean's Kerry, "Babraham Bell," which gave at her prime 1100 gallons per annum; and Martin J. Sutton's Dexter, "Red Rose," that after calving on 20th December 1893, up to the following September, yielded 5 tons 11 cwts. 14 lb. of milk, or over 1220 gallons.

Points.—The Kerry colours are orange skin with black hair, though specimens with red-brown hair do occur in the purest blood, but more frequently in the Dexter variety than in the other. White patches also appear from time to time; but stringent regulations against white markings passed by the Royal Dublin Society exclude from entry in the *Kerry Herd Book* all bulls which are not pure black, with the exception of a little white about the scrotum or sheath in animals of exceptional merit; and all cows and heifers which have white on any part of the body, with the exception of the udder, or extending slightly along the inside of the flank or under side of the belly, or a little on the end of the tail. In general outline, the Kerry has much in common with the Jersey, and also with the Ayrshire, though in size it is, under its home conditions, smaller than either. Its spare form indicates its superiority in milking rather than in beef production.

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[1] For the complete lactation period till 20th March 1914 = 12,077 lb.

The Dexter, which is either "whole black or whole red (the two colours being of equal merit)," though now distinctly, in the breeders' acceptation of the term, a pure Kerry, whatever may have been its origin, is a much more compact, more substantial, and lower-set animal than the Kerry proper. Its toes turn in after a peculiar fashion, and it tends to walk over the outer digits, especially in the case of the hind feet. The leg-bones are shorter and more substantial, the neck thicker and shorter, the horns heavier, not so elevated and airy, and the head heavier and not so deer-like as in the case of the original Kerry. **Pringle** says:—

> "The Dexter has a round, plump body, square behind; legs short and thick, with the hoofs inclined to turn in; the head is heavy, and wanting in that fineness and life which the head of the true Kerry possesses; and the horns are inclined to be long and straight. A great favourite with many persons: the majority of the prizes at shows where there is no separate classification are awarded to Dexters." **Low** says, "the short legs and (the) small space from the knee and hock to the hoofs, have probably given rise to the saying, 'Tipperary beef down to the heels.'"

Low, in 1845, stated that the prevailing belief as to **its origin** was, that it was introduced (whether through crossing or selection was not known) by one Dexter, an agent of Maude, Lord Hawarden; but a considerable amount of doubt exists as to the accuracy of the statement. The present writer, travelling in Kerry some years ago, found that the word "Dexter" was used in a generic sense with reference to all diminutive animals, even men, if low-set and bandy-legged; and also that the term was in the first instance applied to short-legged sheep kept by a resident coastguard officer. Another possible origin is given by **Wm. Hooper**, in an article in the *Royal Agricultural Society of England Journal*,[1] 1898, vol. ix., p. 667, which says:— "There were other cattle in Kerry besides the little black cattle of the mountainous districts, and the cattle of Cork and Limerick were within easy reach. Among them were small deep-bodied cows, on short legs, with heavy bags of milk; such—though even then becoming rare—were to be found in those parts within the last forty years, and were known as 'old Irish cows.' These crossed with a small Kerry bull would produce an animal with all the essential characters of a modern Dexter."

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[1] See also R. A. Pringle's article on "Irish Agriculture," *ibid.*, 1872; also chapter by him in Coleman's *Cattle of Great Britain* (p. 211).

It is probable that the Dexter type originated, like Darwin's Niata cattle (with hollow face and nose turned up, like a small white Yorkshire pig),[1] as a freak of nature, and that the first bull which showed the peculiarity of structure was an intensely in-bred dwarf. In support of this possible view we have the existence of the smaller specimens of the breed, which have from time to time attracted public notice at the leading shows, and the fact that the females often give birth to monstrosities that do not live.

The pioneers of **Kerry introduction into England** were Sir Robert Peel, the Rev. J. C. Macdona, and James Robertson of La Mancha, Malahide, near Dublin (father of the late owner), who was largely instrumental in bringing the breed into prominence by exhibiting good specimens of his own breeding at the Royal Agricultural and the London Dairy Shows. He also carefully selected the young and undeveloped members of the purest and best sorts to be found at the Killarney and other Western Fairs, and shipped them when they came into sale condition to supply the English demand.[2]

Although Kyloe and other **alien blood** has from time to time been introduced among the common cattle in the hands of small crofters, who exercise no special care in breeding, yet the tendency to revert to the original type was so strong in the Kerry breed that a few excellent specimens could till a few years ago be picked out of common droves at the fairs. This is held to be evidence of the ancient origin of the breed, which is believed to be connected with the West Highland, the Welsh, and the Devon breeds, and the Wild White Cattle of Britain. The three men who did most in the Kerry County during the latter half of last century to **maintain the old standard** of quality, and to bring the use of good bulls within reach of their poorer neighbours, were the Knight of Kerry, Glanleam; Richard Mahony, Dromore Castle; and the late James Butler, near Waterville. Now that the Government has wisely decided, once for all, to keep British ports closed to store cattle,[3] there is a distinct encouragement to extend the breeding of both feeding and dairy cattle of the commercial type, to the hilly districts of the United Kingdom, where they would share rough understocked pastures with the mountain sheep: no better foundation stock than the non-pedigree Kerry could be found to produce hardy cross-bred animals of small to medium size, to suit not only a local but a low country demand. One cow could rear two or three calves each year. The experiment was tried on inferior pastures in Gloucestershire some years ago with marked success.

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[1] A small, very much in-bred herd of Niata cattle still survived (1905) in Chili, although the variety died out years ago in Argentina.

[2] The trade is now carried on by Robertson & Sons, La Mancha, Malahide, Co. Dublin.

[3] See footnote, p. 279.

Kerries, of both kinds, especially females, **cross remarkably well** with other breeds; with the British flesh-producing breeds for fattening cattle, and with the milking breeds—Channel Islands and Ayrshire—for dairy cows. Cross animals, at a little distance, often strongly resemble West Highlanders in the variety of their shades of colouring. This is additional evidence of the common origin of the breeds. The first cross with the Shorthorn is a remarkable butchers' animal — the Dexter cross exhibiting greater breadth of shoulder and greater depth through the heart, in proportion to size, than any other British breed. The Straffan Dexter-Shorthorns were bred from first crosses by a Shorthorn bull (page 85). The Red-Polled cross is an excellent general-purpose beast, and the Polled Aberdeen-Angus-Dexter has made a creditable appearance at Smithfield.

The British Friesian.

The Friesian takes its name from the Dutch province of Friesland, which forms the corner of land lying north-east of the Zuider Zee. Predominantly black-and-white in colour, with a characteristic colour pattern, and of pronounced dairy type, the Friesian is probably the most important as it is certainly the most highly improved of the Dutch breeds, of which, however, there are several. To the south-west of Friesland, across the Zuider Zee, the province of North Holland gives its name to a breed very similar to the Friesian, and largely of Friesian origin. The North Hollander is on the average somewhat the larger and the more heavily fleshed of the two breeds, and still has more white in its markings. Following the coast farther to the south-west is the province of South Holland where the cattle consist of a mixture of most of the Dutch breeds, with a proportion of Shorthorn crosses, but where also a native South Holland breed, of a type generally similar to the foregoing, is said to be recognisable.

To the east of Friesland, in the province of **Groningen**, is a breed of quite different characteristics, also black in colour, but with white face and underline, the markings recalling those of the Hereford, though the white is more restricted than in typical modern representatives of the latter breed. The Groningen is a breed of great merit, of dual-purpose type, with somewhat more leaning to the beef than to the dairy side. South-east of the Zuider Zee again, in the provinces of

Gelderland and Overyssel, and throughout the marshes of the Rhine, Meuse, and Yssel, the red-and-white **Yssel breed** predominates. Here the colour pattern is something of the Friesian type, but generally more broken; the Yssel is a dual-purpose breed which has not, however, attained either the pitch of excellence or the degree of uniformity which characterise the Friesian and the Groningen. Apart from special *Herd Books* for the Friesian and the North Hollander, all the pure-bred cattle of Holland, including one or two minor breeds, are registered in their respective sections of the general "**Netherlands Cattle Herd Book**."

The agricultural conditions throughout the greater part of **Friesland** must be regarded as exceedingly favourable to the breeding of cattle. The province consists largely of highly fertile reclaimed sea-marshes. Over three-quarters of its total area of 830,000 acres is under grass, mostly very productive and of excellent quality. The finest pasture country, and the real home of the Friesian breed, is the western half of a circle drawn at a radius of fifteen or twenty miles from the town of Leeuwarden. Here perhaps a majority of the holdings, which are mostly between 50 and 100 acres, have scarcely an acre of arable, and the whole system of farming centres round the cattle. These are at pasture from late April or early May till the beginning of November, and are never under cover during this period, the cows being milked in the field. Normally no additional feeding is given during summer, even to cows in full milk. In winter the cattle are tied up in byres and are never out, the winter feeding consisting of hay with the addition of perhaps 3 lb. of concentrate, the latter being almost invariably linseed cake. Great individual care and attention are devoted to the cattle, and the cleanliness of the Dutch byre is, of course, proverbial; yet it must be admitted that most of the older cow-houses are low-roofed, dark and ill-ventilated, conditions that are reflected in the too frequent occurrence of cases of tuberculosis.

The history of the Friesian is no more fully known than is common with breed histories generally. It is certain that large broken-coloured or flecked cattle have existed in the Netherlands for many centuries. It is equally beyond doubt that these have long been used mainly for dairy purposes. According to Motley, the cattle industry was very important during the early seventeenth century, and the value of butter and cheese exported annually amounted to millions. But a study of the works of the great Dutch artists of the same period forces one to the conclusion that a majority of the cattle of Holland were then red-and-white, and that the white face which persists in the modern Groningen was then commoner than now. Exactly when or why the black came to predominate in the Friesian is not known, but the change of colour is believed to have some connection with the disasters which befell the cattle of Holland during the seventeenth and eighteenth centuries—inundations, and diseases of various sorts, but more particularly **rinderpest**, which raged at brief intervals between 1714 and 1789 and carried off a large proportion of the cattle. Extensive movements of cattle from province to province were necessary to the restocking of the country, and it is reasonable to suppose that some change of the prevailing types resulted; but no particulars are available. It is interesting to note that some few herds of red-and-white Friesians still exist. These are now registered in a separate section of the *Herd Book*, and the two colours are not interbred. Red-and-white calves are occasionally born in the black-and-white herds, cases analogous to those that occur in the Aberdeen-Angus breed.

The **great development** of the Dutch cattle industry began in the fifties of last century, largely owing to the opening up of a large market for fat cattle in Great Britain. The demand for the beef type and the intercourse with Britain that were the immediate results, led at this time to considerable importations of **Shorthorns**, which were used for crossing. Twenty years later, however, it was seen that the results were much less satisfactory than had been hoped. Moreover, an export trade in breeding cattle of the pure native types sprang up soon afterwards, and the relative importance of the trade in fat cattle diminished. Hence it happened that the Shorthorn blood was largely eliminated, and the ultimate result of the importations appears to have been small as regards the cattle of the country generally, and negligible as regards those of Friesland. The high value of Dutch cattle soon became widely realised, and extensive **exportations** were made during the seventies and eighties. The cattle exported were mainly of the Friesland type, though the North Hollander shared in some considerable measure, and the other breeds to a minor extent. Many countries, but particularly the United States, Russia, Germany, Belgium, Sweden, South Africa, Argentina, and Australia have made large importations during and since the period in question.

During the second half of last century large numbers of black-and-white Dutch cattle reached Britain, most of which were doubtless of the Friesian and the closely-related North Holland types. For the twenty years ending 1892 (in which year imports of live cattle were finally prohibited) the number approached 50,000 annually. During the greater part of this period indeed, from 1877 to 1889, cattle could be landed for immediate slaughter only, but during the remaining years a considerable number of milch cows were brought over, and a good many herds were formed, especially in the Eastern Counties, although no widespread efforts were made to preserve the breed. "From the time of the cessation of importation until the formation of a Society in 1909, several herds were maintained in a pure state, but only in a few cases had owners endeavoured to improve their stock or even to retain the uniform character of the Friesian type.[1] Among the principal **herds of pre-registration times** were those of Earl Egerton at Tatton Park, Cheshire, dispersed in 1909; John Twentyman of Hawkrig, Cumberland, dispersed in 1903; Richard Ford, Garton; Lord Rayleigh, Terling, Essex; John Brown, Hedges, St Albans; and, probably most important of all, Hugh Brown, Colton Mains, Dunfermline. The last-mentioned herd was dispersed in 1919, when 96 head brought an average price of over £550.

Interest in the breed, which was languishing in the end of last century, reawakened rapidly after the formation of the Society and the commencement of **registration** in 1909. As but few and incomplete pedigree records were available in most herds, registration of the foundation animals was based mainly on inspection, a group of five leading and experienced breeders carrying out the work. Soon after this time the need began to be felt of a **fresh infusion of blood** of unquestionable purity, and permission was obtained from the Board of Agriculture for the importation in 1914 of 39 bulls and 20 cows from Friesland. These cattle, purchased at quite ordinary prices in Holland, have, owing to their limited numbers and the increasing popularity of the breed, reached extraordinary values in this country, individuals having changed hands at two, three, and even in one case over four thousand guineas. While it would be difficult wholly to justify such prices, in face of the proved merit of much of the home-bred stock, there can be no question but that the importation has been of great value to breeders.

In October 1921, Lt.-Col. W. E. Harrison, President of the B. F. Cattle Society, announced an agreement between the British and South African Governments to permit the importation of pure Friesian cattle on the following conditions:—

"The South African Association will, at their own expense, send to this country the best available young stock, complying in every respect with the Government's conditions as set out in the permission, and after undergoing the necessary periods of quarantine, the imported cattle will be sold in this country by public auction under the auspices of this Society. The animals to be so imported will, so far as possible, be fifty males and fifty unserved heifers from one year upwards and as young as possible above that age. In accordance with the Government's conditions, the young stock so imported will be from dams having certified Government yields of 12,000 lb. of milk in 300 days and with a minimum butter-fat percentage of 3.3."

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[1] See article on "British Friesian Cattle" by George Hobson, Secretary of the British Friesian Cattle Society, in the *Transactions of the Highland and Agricultural Society*, vol. xxx., 1918.

Negotiations for the introduction of Friesians from Canada had broken down, "as upon investigation the information previously given with regard to Canada could not be substantiated, and the British Society would have had to buy the animals in Canada and bring them at the Society's expense, involving a very large outlay of capital." Importation from Holland in 1921 was out of the question owing to the prevalence of disease in that country. The members of the Association were by no means unanimous as to the wisdom of the introduction, but 95 cattle were shipped and landed, and finally sold in 83 lots at Slough on 8th June 1922. (See Appendix H.)

The **general type** of the Friesian is that of a large dairy animal. Mature cows **weigh** on the average about 12 cwts., and occasionally up to 15 cwts. in ordinary breeding condition. Mature bulls average perhaps 17 or 18 cwts., exceptional individuals in show condition reaching 24 or 25 cwts. The **special breed points** are as follow:—The *face* moderately long, with rather straight nose; the *horns* small, curving forwards and slightly inwards, light coloured with dark tips; the *neck* somewhat shorter than in the conventional type of dairy animal; the *withers* moderately thick; the *barrel* large, with *ribs* well sprung; the *intervals* between the processes of the vertebræ, between the ribs, and between the last rib and the hook, all wide; the *rump* exceptionally wide, especially at the *pin-bones* and through the "*thurl*," as the region between the hip or ball-and-socket joints is called; the *thighs*, compared to those of other dairy breeds, thick and heavy. In the female the *milk veins* and *udder* generally show great development, but the latter is frequently rather pendulous, and not carried forward as well as could be desired. The *teats* are of moderate size and generally fairly well placed. The *colour*, to which, as an indication of purity, great importance is attached, is black-and-white in large and distinct patches. The *legs*, or at least the *feet*, and *switch* are white, a black foot being sufficient to prevent an animal's registration. Apart from this the white tends to be confined to the underline, two broad irregular bands round the heart and hind-quarters respectively, and a star or heart-shaped marking on the forehead, but the proportion of the two colours varies greatly. The *hair* on any particular part should be of the same colour as the underlying skin. Occasional dun-and-white animals are met with in British herds. Females of this colour are still accepted for registration, but males are debarred, and the colour will doubtless be ultimately bred out.

Rather **common faults** in conformation were a drooping rump, a lack of development behind the shoulder, and a general lack of what the British breeder calls *quality*, in head, bone, and hide, until modified by the cattle imported in 1914.

From the **utility point of view** the Friesian's main claim to favour rests on its capacity for heavy and sustained **milk yield.** In its native province the average yield is remarkably high, probably nearly 900 gallons for mature cattle, and in some of the better herds the average for cows and heifers reaches 1000 gallons. In the **United States and Canada**, under highly artificial conditions it is true, extraordinary individual records have been made. Nine separate animals have given over 3000 gallons in 365 days or under. In **this country**, 48 cows have made records of 2000 gallons or better within the year. The breed has assumed a leading position in the "Annual Register of Dairy Cows" compiled from records of Milk Registering Societies, under the rules of the Ministry of Agriculture, and also in competitions against other breeds for the National Dairy Herds Silcock Cup and the London Dairy Show Championships.

The **quality of the milk**, at least as regards butter-fat, is very generally poor. In Holland the average butter-fat content is said to be between 3 and 3·2 per cent.; and individual cows, whether in Holland or elsewhere, occasionally fail to reach our British presumptive standard of 3 per cent. But the fat content, as with other breeds, is capable of being raised by selection, and there is no particular difficulty in bringing herds up to the normal fat percentage of say 3·7, or perhaps still higher. The British Friesian average record at the London Dairy Show of 1920 was only 3·5 per cent., but in 1921 a remarkable improvement to 4·25 per cent. was recorded. The **fat globules** are small, like those of the Ayrshire, so that the milk does not cream rapidly on setting. This, of course, is an advantage in the making of cheese.

As a **meat producer** the Friesian cannot be said to be good. The calves are exceptionally large, weighing very generally 90 or 100 lb. at birth, and feed rapidly into excellent veal. But for beef purposes the steers continue to grow too long, and reach an undesirable size before they can be got fat. Moreover, the meat is not well marbled, the fat being taken on largely inside and under the skin rather than in the muscle. It has, however, been shown, more particularly by Scottish breeders, that a good **dual-purpose type** can be attained by selection.

In general it may be said that the Friesian is a cow for good conditions. **Food** need not be of specially good quality, for cattle of the breed can economically consume large quantities of coarse forage. But food must be abundant; where upland pastures with scanty herbage prevail, preference should be given to one of the smaller and less exacting breeds.

The type of Friesian varies in different parts of the world, not only on account of varying conditions of life but more largely owing to differences in the ideals prevailing among the breeders. **In America,**[1] selection is being made almost exclusively on the basis of milk records; and, as already mentioned, very notable results have been achieved. The **Dutch view**, on the other hand, appears to be that specialisation in the direction of milk-producing capacity has proceeded as far as is safe meanwhile; and that, while preserving the milking powers, breeders should devote close attention to conformation, substance, and constitution. Even in Britain there is some divergence of opinion as to type, the Scottish herds being rather of a robust dual-purpose type, while in England a few breeders are following the American ideal of pure milking capacity. The future of the breed is worthy of close study from the general standpoint of the cattle breeder.

The Blue Albion is an old Derbyshire dual-purpose breed which seems to have been developed, like the non-pedigree milking Shorthorn of Cumberland and Westmorland, as commercial cattle, to suit the ordinary farmer, before the rage for pedigree and milk records began. It inclines more to the Shorthorn type than to any other, and, although its origin is entirely conjectural, it has been suggested that a Shorthorn cross with the black Welsh breed would, in the F. 1 and F. 2 generations, develop the variety of colour accepted as characteristic of the breed. The method of fixing being a matter of chance under the general influence of practical utility, is of necessity not on record. The result is irregular, as an acknowledged type to breed up to has been wanting. The best specimens are shapely and of excellent quality, their coats fine and silky, and the farmers swear by them "as feeders, breeders, and milkers." The home of the breed in the North Midlands is the hilly country of West Derbyshire, centring on Rowsley and Bakewell; and what appears to be the secret of the breed's success at home, and to hold out prospects of great possibilities in other districts and other climates, is its wonderful constitution and general hardiness, including ability "to thrive on coarse pastures and in exposed districts." It makes an admirable small man's cow, giving large quantities of milk of superior quality, and at the end of its milking career feeding quickly, and producing good beef. By aid of pedigree and milk records, it is rapidly developing into a rich man's cow. Rumours were heard of the superior merits of the breed for some ten or twelve years. Then the Blue Albion Cattle Society, composed chiefly of Derbyshire farmers and breeders, together with votaries in Staffordshire, Cheshire, Leicestershire, and as far as Devon, was formed in 1920, with W. J. Clark of Alport, Bakewell, as its first Secretary and Editor of the *Herd Book;* Colonel Harrison of Wychnor, Staffordshire, as President; and Captain Holden of Southam Grange, Warwickshire, as Vice-President. The *Herd Book*, 31st December 1920, contained over 500 head, including some 70 bulls. An admirable detailed set of regulations has been issued. This defines the colour: "either blue, blue and white, blue roan, or blue roan and white." Other writers have referred to it as "a kind of silver grey or blue roan—from very dark, to as light as a silver-grey rabbit"; "blue and white being the most frequent coloration"; and "pigeon blue a good description" of the blue of some specimens; "China blue and white is a colour aimed at." The horns are white with black tips, and turn slightly up like the horns of many of Bates's cattle. It is interesting to note in passing that there is a blue-grey humped breed at Bundlekhand, India, believed to have been formed by crossing a black and a white breed of zebus. The Blue Albion breed made a most successful début at the Derby Royal Show of 1921, with twenty-four entries in three classes, and it was so highly appreciated that its general popularity may be anticipated.

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[1] The breed is officially known in America as the **Holstein-Friesian**, and is commonly spoken of as the "Holstein." It has, however, no connection with the province of that name.

Leading breeders include :—

Geo. W. Axe, Bank House Farm, Hartington, near Buxton ; E. Caudwell, Hall Farm, Rowsley, Derbyshire ; Lieut.-Col. E. W. Harrison, Wychnor Park, Burton-on-Trent ; Mrs C. W. Heriot, Sanham, Melton Mowbray ; Capt. J. E. N. Holden, The Grange, Southam, Warwickshire ; J. W. Pursglove, Matlock, Derbyshire ; T. Shimwell & Sons, Home Farm, Rowsley ; H. Smith, Stanton Old Hall, Rowsley ; A. Trafford, Dulands Farm, Bradbourne, near Ashbourne ; H. Whitley, Primley, Peignton, Devon.

CHAPTER XI

MILCH CATTLE. THE CHANNEL ISLANDS BREEDS. JERSEYS AND GUERNSEYS

Channel Islands Cattle Exported as "Alderneys"—**The Jersey**—Origin of its Excellence—Colours of the Breed—Association with Prehistoric Remains—How Bred Pure—Revival of the Breed—Colonels le Couteur and le Cornu—The Jersey (Island) *Herd Book*—The English Jersey Cattle Society—Its *Herd Book* and Influence—American Demand—Prices—Prominent Breeders—Influence of Soil and Climate—Noted Strains—Jersey Steers—Points of Cows and Bulls—Quality of Milk—Docility and Bad Temper—Milk Records—**The Guernsey**—Compared with the Jersey—Influence of Climate—Guernsey Butter and Beef—Prices and Numbers of Cattle—Antiquity of the Breed—Prominent Present-day Breeders—**The Alderney**—Origin and Present Position.

CHANNEL Islands cattle were for many years imported into England under the generic name of "Alderney," although the animals from that island have been throughout the least important. The misnomer is supposed to have originated in one of three ways: from Alderney cattle having been the first sent to England; through English officers being stationed in Alderney, and thus identifying all the kindred breeds by the name most familiar to themselves; or, most probably, because the Channel Islands "packets" touched last at Alderney, so that all the cattle, whatever their origin, came by way of Alderney.

The Fowlers, who were long the great exporters of stock from the Islands, before Herd Books existed, adhered to the name "Alderney" which they found in common use. This was rather an unfortunate practice in the interests of the legitimate Islands trade, as it enabled dealers in inferior Brittany cattle to get them cleared through Alderney for England as genuine Islands cattle.

The Jersey[1] is the most numerously represented—the normal stock of the Island varying from 11,000 to 13,000 head

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[1] Articles on Jersey cattle appear in the 1880 *Report of the Agricultural Department, Washington;* in the *U.S.A. Consular Reports on Cattle and Dairy Farming*, 1888; and the *Journal of the Royal Agricultural Society of England*, 2nd series, vols. xiv., xvii., and xxi. For much information the Author is also indebted to the exhaustive treatise on the history of the Jersey breed of cattle by John Thornton, being the introduction to the first volume of the *English Herd Book of Jersey Cattle*, 1880.

—and the most prominent of the three breeds, which at some distant date sprang from the cattle of the adjacent French coast. Some specimens of these animals, especially in the mountainous parts of Brittany, so strongly resemble Jersey cattle, although very inferior in milking qualities and the development of good dairying appearances, that they were at one time sold in large numbers in this country as Islands cattle, to the detriment of the good name of, and injury to the trade in, the genuine animals.

As far back as 1734 superiority was claimed for Jersey cattle. Colonel le Couteur attributes the excellence of the cow "to the circumstance of a few farmers having constantly attended to raising stock from cows of the best milking qualities, which attention, prosecuted for a long number of years in a small country like ours, where such superior qualities would soon be known, led to the excellence of milking and butter-yielding properties of the race at large. This never could have been attained so generally in Normandy, from whence our breed probably originated, or in any other extended country."

The "whole" or "self" colouring, and the light shades which prevail (prominently fawn or greys) in the modern Jersey are of comparatively recent date, and have been encouraged by many English and American buyers, who were partial to them.

Cattle are now bred chiefly with a view to merit in performance, and colour is a secondary consideration. The loss in the milking qualities of the breed resulting from breeding for fashionable colours was very striking. Silver-grey, a colour believed to have sprung from a Swiss cross, was in great repute in England in the early seventies of last century, and animals with defective udders were kept for breeding on account of their colour. The silver-greys soon lost caste, but not before some mischief had been done. Popular opinion accredited them with producing very pale milk. The mulberry, a dull, dark brown coat, with hair of a reddish tinge in it, is indicative of rich milk. It is a colour of hair high in favour in America.[1] The colour of the bull is generally darker than that of the cow, although fawns with black points are quite common. A mulberry fawn or bronze is a good characteristic colour, and the dark mulberry bull shows a dappled brown sheet over the back and a light grey ring round the muzzle. This, and a nearly allied dark brown with a "mealy mouth" or silvery ring, and a light brown over the back and sides to the midrib, are favourite and hardy colours. The second-prize bull of the Island in 1905 was black, with white legs and patches, and a brown line up the ridge of the back-bone. Some cows are black, shading into brown with white patches, like an Ayrshire, and with udder and teats also black.

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[1] At the Jersey Spring Show, held on 18th May 1905, the following were the respective numbers of the different colours of 214 cattle entered in the Catalogue with colours stated:—Fawn, 72; fawn and white, 15; grey-fawn, 10; light fawn, 5; dark fawn, 3; brown, 53; grey-brown, 10; dark and light brown, 6 and 8; dark grey-brown, 2; brown and white, 5; mulberry, 4 (probably some of the mulberries were entered as browns or blacks of sorts); grey, 8; dark grey, 5; light grey, 3; and the remainder, one specimen of each, black, black and white, light and dark grey-brown, and grey and white.

The original unimproved Jerseys described by the early writers[1] were variously coloured, "commonly red or red and white, occasionally cream-coloured or cream mixed with white, black with a dingy brown-red about the nostrils and on the back ridge," and also "black, and black and white." Most of these colours still appear among well-bred cattle. Blue spots on the white, and a blue ring round the edges of white patches, are held to be indications of good milking quality.

Thornton calls attention to the similarity of colouring, and to the correspondence in the appearance of the older forms of the Brittany, Kerry, Welsh, Cornish, Shetland, and Ayrshire breeds. He further points out that these are usually located in the vicinity of prehistoric remains, and that there is a strong presumption that they are the most direct descendants of the small-sized, short-horned, dark-coloured breed, the earliest domesticated cattle of Great Britain, commonly misnamed "*Bos longifrons*." They are found clinging to existence on the fringes of civilisation in out-of-the-way corners, where they and the associated prehistoric remains would naturally meet with least interference during the many disturbances which overwhelmed, and destroyed or altered the features of the more accessible interior of the country. In the colour of some West Highland cattle there is a very striking resemblance to the fawn of certain specimens of the Islands breeds, more especially to the yellowish-fawn of the Guernsey.

Jersey cattle have been **bred practically pure** for a longer period than any of our British varieties, on account of the importation of foreign cattle to the island being forbidden by law. "**Acts of the States of Jersey**," dated 1763, 1789, 1826, 1864, and 1878, detail severe prohibitive penalties against the fraudulent importation of cattle from France; which penalties had the object of excluding disease, preserving the purity of the breed, and fostering the export of Jersey cattle to England.

Jersey cattle **degenerated** during the first three decades of the nineteenth century. The great **revival** of the breed was brought about by the formation, in the autumn of 1833, of the **Royal Jersey Agricultural and Horticultural Society.**

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[1] Thomas Quayle, author of *The General View of the Agriculture, etc., of the Islands on the Coast of Normandy*, 1812; Garrard on *Varieties of Oxen common to the British Islands.*

Many have taken part in the work as breeders, but the **two grand old men** of Jersey cattle fame are **Colonel le Couteur** and, following him, **Colonel le Cornu,** whose far-seeing wisdom and untiring devotion to the best interests of the breed have done so much to secure its present enviable position in competition with other dairy cattle. Among its claims to superiority is the freedom of Jersey Island cattle from tuberculosis. A few Guernseys were admitted to have been affected, but it is believed that the disease has been stamped out. In some highly bred strains of Jersey cattle the very prominent eye develops a diseased and inflamed condition known as "gimlet" eye, from the way the eyes roll.

Colonel le Couteur has left the following **early description of the breed** :—"The Jersey farmer, conscious of possessing a breed excellent for the production of rich milk and cream . . . sought no further, but was content to possess an ugly, ill-formed animal, with flat sides, wide between the ribs and hips, cat-hammed, narrow and high hips, with a hollow back." Nevertheless, "she possessed the head of a fawn, a soft eye, an elegant crumpled horn, small ears, yellow within, a clean neck and throat, fine bones, a fine tail—above all, a well-formed, capacious udder, with large swelling milk veins."

The Jersey Herd Book, begun in 1866, materially contributed to the improvement of the breed from the point of view of good looks, and the unshapely form of the old-fashioned Jersey was speedily changed to that of the elegant and graceful creature of the present time. But beauty of form and superior milking qualities do not necessarily go together.

One important superiority possessed over other *Herd Books*, made possible by the moderate area of the Island, is that each animal must be inspected and attain a certain standard of merit before it can be registered. Those passed are classified by the *Herd Book* judges as "commended" or "highly commended." The merits of the dam are taken into account in the case of a bull, and no heifer can be entered in the *Herd Book* until she has borne a calf. Those who favour inspection think that it is by such means that the Jersey cow has reached its high position of merit in the production of rich milk during a prolonged period of lactation.

Dr Watney adds :—"While no cow or bull can be admitted to the *Herd Book* except as above, it should be carefully kept in memory that all cattle without exception bred on the Island are considered to be pure bred, even if their dams, sires, and their ancestors are not entered in the *Herd Book*, *i.e.*, if they are non-pedigree, yet they are equally eligible—with the descendants of the cattle of the *Herd Book*—to be entered should they show merit. The only difference is that for one generation the one are classed as F.S. (Foundation Stock), the other as P.S. (Pedigree Stock).

Thus the gold medal cow of 1906, who made 3 lb. 6½ oz. of butter, the record result that had been obtained in the Island, was Foundation Stock.

A record of 3 lb. 4¾ oz. of butter, produced in twenty-four hours, was formerly claimed for an Island cow.[1] The funds of the *Herd Book* are kept separately, but the management is under a Sub-committee of the Society.

About 1853 a demand sprang up in America for Jersey cattle; and one leading endeavour of the Board of the Agricultural and Horticultural Society has since been (in view of the increase of this demand), to encourage breeders to keep their best stock, at least for a time, in the Island, so as to secure the retention of a share of the best blood. Prize bulls must now remain for a year, else the prizes awarded at the Society's shows are forfeited. In 1882 **another American boom** in prices of Jersey cattle did a lot of harm, and the Island took several decades to overcome the evil effects. From £500 up to £1000 was then paid for a cow, and from £100 to £300 were fairly common prices realised for cows and heifers. Few bulls went to America at that time, and it is believed that the highest price, though only £200, was paid for the celebrated bull "Wolseley," the property of M. Francis Le Brocq, of St Peters.

> Another stage is the growing appreciation of the Jersey breed in the United States. Since the first decade of the century many of the best cattle from the Island of Jersey have gone there and "the price of the best Island cattle has therefore largely increased; indeed the American buyers control to a great extent the export trade of the better class of Jersey cattle from the Island."

Before the War nearly 1000 head of **Jersey cattle were shipped** annually across the Atlantic. This trade is now under restrictions, introduced in the early years of the War to prevent the depletion of the Island herds, and only importers of long standing are allowed to purchase. Many more Jerseys go to England than to U.S.A.

The Jersey is in special favour as a "Home Cow" in the Southern States south of the Ohio river or the Mason Dixie line, not only because of the superior quality of her milk and cream, but because of her small size; and the black points, and darker skin than the Guernsey has, are correlated with the ability to stand the greater heat of the sun in these regions.

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[1] "Two English-bred Jersey cows have made over 3 lb. 9 oz. of butter at a public test. They were both descended in large measure from the Dauncey old English Jersey blood."—WATNEY.

There is now no demand for the fancy types of Jersey, although a certain prejudice against broken colours still exists. Beauty and utility combined is what is striven for by breeders. Owing to the increased values, the trade with Denmark in surplus general-utility stock (at one time considerable) ceased before the end of the first decade of this century.

Prominent Jersey Breeders in the Island, 1920, were:—

P. J. Brée, La Sente, La Rocque, Grouville; T. J. Brée, Fauvic Farm, Grouville; John Du Val, La Caroline, St Peter; C. J. Labey, Highfield, Queen's Road, St Helier; W. J. Labey, Le Parcq, Grouville; E. E. Leonard, Ville au Neveu, St Ouen; F. & C. Mourant, Croix des Mottes, St Saviour; P. C. Mourant, Mont au Prêtre, St Helier; J. A. Perrée, Oaklands, St Helier; Geo. J. Querée, La Haque Manor Farm, St Peter; P. J. Simon, Slate House, St Clement.

When bred out of the Island, Jerseys often grow stronger bones, become more massive, and lose the deer-like features of the genuine home-bred animals. That the combination of the soil (said to cultivate more kindly than the soil of any other part of the world) and the climate of the Island has much to do with the size and character of the cattle, is shown by the fact that on the cliffs of St John's a small and hardy variety of the breed was once prevalent. Foreign breeders consequently find it necessary to come back to the Island for sires to maintain the characteristic features of their herds. We have a parallel to this in the selection of bulls from North Devon to take into surrounding districts which produce varying types of the Devon breed.

The **Bagatelle** strain of blood is said to be one of the best in the Island for milking, as well as for refinement and symmetry. The **Oxfords**, bred by the late J. P. Marett, belong to one of the most noted strains. "Oxford Dahlia," owned by Lord Rothschild, took the Championship of the Royal Agricultural Society of England three years in succession in the inspection classes.

The **English Jersey Cattle Society** (1878) published the first volume of its *Herd Book* in 1879.[1] It initiated butter-test classes at shows in 1886—an institution (originated by John F. Hall) which has since found conspicuous favour in other parts of the British Empire, in America, and on the continent of Europe. One useful outcome of this movement was the annual competition at the Tring Show, where all classes of dairy cattle were attracted by prizes offered by the late Lord Rothschild. Similar competitions still take place at the Society Shows of the Royal Agricultural of England, the Bath and West of England, the Royal Counties, and the British Dairy Farmers. The influence of the English Society has done much to bring the merits of the breed in its commercial capacity to the notice of the general public.

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[1] It has since published *Jersey Cattle, their Feeding and Management* (3rd edition), 1911 (Vinton & Co., Limited).

The following are a few of the most **prominent British breeders** of Jersey cattle, selected from the list of members (numbering over 800), published by the English Jersey Cattle Society:—

Mrs Austin, Ellern Mede, Totteridge, Herts; W. E. Budgett, Henbury, Bristol, Gloucestershire; R. W. Carson, Halse Copse, Brackley; H. Corner, M.D., Brook House, Southgate, Middlesex; Mrs Evelyn, Wotton House, Dorking; Col. L. Gisborne, C.M.G., Lingen Hall, Brampton Bryan, Herefordshire; Lt.-Col. The Hon. H. G. Henderson, Kitemore, Faringdon, Berks; S. G. Hough, Springhouse Park, Theydon Bois, Epping, Essex; Ernest Mathews, Little Shardeloes, Amersham, Bucks, *hon. member;* Major the Hon. Harold Pearson, Cowdray, Midhurst, Sussex; Hugh Leyborne Popham, Hunstrete House, Pensford, Somerset; J. H. N. Roberts, Weybeards Farm, Harefield, Middlesex; Lord Roundway, Roundway Park, Devizes, Wilts; Mrs Rudd, New Chapel House, Lingfield, Surrey; A. W. Ruggles-Brise, Spains Hall, Braintree, Essex; Mrs Hayes Sadler, Norsebury, Sutton Scotney, Hants; Hon. Mrs Murray Smith, Gumley Hall, Market Harborough; Sir Edward David Stern, Bart., Fan Court, Chertsey, Surrey; R. Bruce Ward, Godinton, Ashford, Kent; Dr Herbert Watney, Buckhold, Pangbourne, Reading; Mrs Edgar Watts, Eastwood, Falfield, Glos.; Brig.-Gen. J. T. Wigan, C.B., D.S.O., M.P., Danbury Park, Chelmsford.

There have been **five English breeders** who have specially turned their attention to the development of butter-producing qualities in Jersey cattle — the late Dauncey of Horwood, Bucks; Baxendale, of Bonningtons, Ware, Herts; Lord Braybrooke, Audley End, Saffron Walden, Essex; J. H. Smith Barry, late of Stowell Pewsey, Wiltshire; and Dr Herbert Watney, Buckhold, Pangbourne, Berks.

Dauncey was the great pioneer, though his achievements have not only been equalled, but surpassed, at Buckhold. He bred Jerseys for about forty years before the days of cream-separators, which introduced a ready means for testing the quality of milk; and the account of his displenishing sale is recorded in Vol. I. of the English Jersey Society's *Herd Book.* Dr Watney, who has so successfully extended the lines laid down by Dauncey, wrote of him as "the greatest breeder of Jerseys ever known"; and claimed credit for English Jersey breeders, from the conspicuous fact that many of the winners at the great Chicago and St Louis Butter Tests were descended from Dauncey blood, exported to America by John Thornton. American farmers were not slow to recognise the merit of the Dauncey strain, in spite of their reputed coarseness—the large useful type being better able than the deer-like, refined varieties (more notable for beauty than for performance) to compete at milking trials against cows of other breeds. The practical result has been that, at the two great international contests named, the Jersey breed carried off the prizes for economical production of butter and "milk for all purposes relating to dairying."

At the six great Shows in England, viz., the R.A.S.E., Bath and West, Royal Counties, Tring (before Tring was discontinued in 1919), Tunbridge, and the London Dairy Show, Jerseys were judged in two entirely different ways:—

A. In the inspection classes, solely by their appearance, including a large shapely "bag";

B. In the butter-test and milking classes, entirely by their milk and butter production.

Dr Watney has pointed out (1920) that as the cows successful in the butter-tests have as a rule been milked out at home very carefully and regularly, they have not very large udders; and so much is this the case that anyone who only looks at the cows in these different classes would certainly value the Show cows at double the value of the butter-test cows, though a study of the records will show that few of the prizes in the butter-tests are won by the cows that have won inspection prizes.

Few of the owners of large herds of Jersey cattle in England make butter for sale; the majority sell surplus milk, therefore favour is shown to cows which can produce many gallons in the year, rather than to those that produce much butter-fat.

Again, the majority of owners of prize Jersey cows desire cows that produce much milk, because it is easier to win prizes in the inspection classes with such cows than to win with cows giving large quantities of butter-fat. Therefore the English preference for large quantity against high quality of milk, *and the breed in England as a rule does not improve.*

Because the two qualities of producing much milk and of producing much butter-fat are somewhat antagonistic, to introduce a large producer of milk into a herd of good butter cows and to breed and use a bull from that cow will probably injure the future herd and reduce its butter-producing qualities.

Of late years, in the herds of Jersey cattle in England, there is a large amount of buying and selling, but little continuous breeding. In the majority of the best herds it is rare to find three generations of cattle. One prominent exception is the herd of J. H. Smith Barry, in which records are kept of the amount of butter-fat and milk that the cow has given in a year or during a lactation period. In England the "Gerber" test is so little used that butter records, or records of the butter-fat, are hardly ever given. The *English Jersey Herd Book* for 1918 contains only two owners who gave the milk and butter records of their herds.

WINNERS OF BUTTER TESTS.

	Gold Medal.	Average Points.	Silver Medal.	Average Points.	Bronze Medal.	Average Points.
English bred, won . .	44	48·4	31	46·2	39	42·8
Island bred, won . .	11	47·7	23	43·5	15	43·5

The above table shows the relative showyard positions of the English and the Island-bred cattle in the butter tests during the ten years, 1896-1905, at the six Shows referred to, where medals were given by the English Jersey Cattle Society.

Dr Watney's success as a breeder of Jerseys is worthy of the closest attention, as beginning so recently as 1890, without special knowledge of any breed of cattle and adhering rigidly to the one aim, that of butter-production, he has achieved a phenomenal record. He has but once shown for appearances; but in the butter-tests during eleven years up to 1906, the Buckhold herd won more gold medals than all the other herds of English-bred Jerseys combined, and 80 out of the total of 181 medals awarded. This was accomplished by disregarding colour, size, shape, and every other fancy characteristic, and breeding exclusively for butter yields. The herd was formed by purchasing the best performers with hereditary butter-producing tendencies that could be found in the market; and was subsequently continued with home-bred animals which developed powers of butter-production beyond anything that money could buy.

The following analysis of the figures in the foregoing table relating to Jerseys shows the unprecedented success achieved by the representatives of Dr Watney's herd in ten years:—

	Island Bred, won	English Bred, not Bred by Exhibitor, won	English Bred, Bred by Exhibitor, won
	G. S. B.	G. S. B.	G. S. B.
All other English Herds .	9 17 13=39	8 9 14=31	11 6 14=31
Buckhold Herd . . .	3 7 3=13	8 3 1=12	22 18 15=55
	Total . 52	Total . 43	Total . 86

G. = Gold medals. S. = Silver medals. B. = Bronze medals.

Dr Watney has demonstrated—(1) that the hereditary tendency to butter-production is a matter of the first importance in breeding dairy stock; (2) without keeping a butter record it is impossible to breed with any certainty for butter; (3) in-breeding to any great extent is a dangerous policy to pursue, owing to the consequent loss of constitution; (4) the cattle winning prizes for butter yields at public shows are not necessarily the cows that take the highest places in the annual butter records, in which the property of giving much rich milk for a period of eight to ten months is a most important factor; (5) careful milking at regular intervals is absolutely essential; (6) on the whole, "the English Jersey cows which are entered for the butter-test classes have considerably smaller udders than the cows which are presented in the inspection classes." (7) Great strength of constitution is required in a cow that gives a weight of milk equal to her own weight in sixteen to eighteen days, and is able to give a weight of butter-fat equal to half her own weight in one year. (8) There are families which are uncertain breeders, and are not suitable for Foundation Stock in a herd. (9) Some families bear a very small proportion of heifers among their calves. (10) It is necessary, in holding a record position, to keep all the very good cows and all the best calves, to increase the chances of producing something phenomenal, and to decrease the possibilities of reversion to inferior types of milkers. (11) It is fatal to follow the practice of many breeders and overfeed the calves, or to give the milk insufficiently diluted in feeding the quite young stock. (12) In many cases milking cows are kept too poor. Then cows of good pedigree either " have to give less than their full record, or to waste themselves until they are hardly on the border-line of good health"; but, on the other hand, cowmen are apt to overfeed cows going in for butter tests, so that they do not give such good results as are got from them at home. (13) The greatest milkers and noted prize-winners have the greatest vital force, as shown by a cow producing 3500 lb. of butter in seven consecutive years; by gold-medal winners producing twelve to fourteen calves; and by cows appearing in the winning lists at first-class competitions for six successive years. Another striking illustration of this fact may be given in Captain Smith Neill's brindled cow, of mixed Channel Islands blood (Plate LXXII. B), which in 1906 at twenty-four years of age, and for the fifth time in succession won the first prize for butter at the London Dairy Show in the class for cross-breds.

This cow, purchased as a heifer by Doctor Woollerton of Wendover, Bucks, from Adams, a cattle-dealer of Little Kimble, Bucks, in 1882 or 1883, calved a bull calf shortly after. Dr Woollerton sold her twice to local men because she gave too much milk for his requirements. On the third occasion, in September 1902, Captain Smith Neill secured her for £15. She subsequently won the following Premier Prizes :—Milking trials (cross-bred class), London Dairy Show, first prize in 1902 and 1905. Butter-tests (cross-bred class), London Dairy Show, first prize in 1902, 1903, 1904, 1905, and 1906. Milking trials at Tring, first prize for a cow under 900 lb., in 1904, 1905, and 1906. The Lord Mayor's Cup, in 1905, for a cow other than a Shorthorn giving the most milk in the milking trials of the London Dairy Show. Her total earnings in money were £115; and her milk record, 1903, 12,707 lb.; 1904, 11,696 lb.; 1905, 10,469 lb. From 28th April to 1st November 1906, 8837 lb., when she was still giving 20 lb. per day. Her last record would no doubt have been better, but for injuries received through being knocked over by another cow at the Dairy Show.

The following description of **four of Dr Watney's noted cows** (Plate LXXVI.), given by the owner, is an interesting record of the milking powers of the Jersey breed of cattle, and, at the same time, gives concrete proof of many of the thirteen deductions from breeding experiences which have been culled from Dr Watney's statements. The photograph was taken from life in the year 1903:—

"'**Red Maple**' was calved in 1896. Living, and won prizes in 1906. The cow, her sire, dam, one grandam, and both grandsires were bred at Buckhold. She gave an average of 484 lb. of butter per year for six consecutive years. She won four gold medals in the butter-yield tests. At the R.A.S.E. in 1904 she gave 112 lb. of milk and 5 lb. 13½ oz. of butter in the two days' test, fifty-three days after calving. She was descended from 'Maple,' who won one silver medal, and from 'Cleopatra,' who won one gold medal.

"'**Sharab**' was calved in 1896, and killed in 1905. This cow, her dam, her sire, and grandam were bred at Buckhold. She yielded an average of 540 lb. of butter per year in five consecutive years. Her highest yearly record for any one year was 615 lb. of butter. She won four gold medals in the butter-yield tests. At Tring, in 1902, she gave 3 lb. 9¾ oz. of butter in one day, 128 days after calving, and thereby established a record for Jersey cows in England and Jersey at a one-day's test. At the Royal Counties Show, 1902, she gave 56 lb. of milk in one day, seventy-three days after calving. She is descended from 'Sherbet,' one gold medal; 'Sherry,' one gold medal; 'Lady of the Isles the 3rd,' one gold medal.

"'**Blue Bell**' was calved in 1894, killed in 1905; bred by Mr S. Baxendale, Bonnington, Herts. She gave an average of 398 lb. of butter per year for seven consecutive years. She won three gold medals in the butter-yield tests. She was descended from 'Chestnut the 2nd,' who won four gold medals, and from 'Broom,' winner of the first gold medal given by the English Jersey Cattle Society, in 1887, for butter yields.

"'**Violette**' was calved in 1897, and lived to win prizes in 1906. An Island-bred cow, entered in Vol. XV. *E.J.H.B.* as a Foundation cow, *i.e.*, pure bred but without pedigree. She gave an average of 512 lb. of butter in the three consecutive years she was at Buckhold. She won two gold medals in the butter-yield tests. In the Island of Jersey she gave 3 lb. and ¾ of an ounce of butter in one day, sixty-seven days after calving.

"These were **four great cows** in a great butter herd. For the year ending 30th September 1904, twenty-six cows that were in the herd the full year produced 12,156 lb. of butter. The highest individual yield was 619·31 lb. of butter, and the lowest (with one exception), 245·17 lb. 'Sharab' stands fourth in the list, 'Red Maple' tenth, 'Violette' eleventh, and 'Blue Bell' twenty-second. So it is evident that the Buckhold herd contained a lot of other superior year-round workers in addition to these gold-medal winners."

Dr Watney announced in October 1921, the date of the displenishing sale of the Buckhold Jersey Herd for June 1922.

At the Bath and West Show in 1920, the Jersey cow "**Ida**," belonging to **R. Bruce Ward**, Dodington, Ashford, Kent, gave 51¾ lb. of milk, 107 days after calving, obtaining 58·45 points—more than 10 points higher than any other breed other than Jersey. At Tunbridge Wells, though second to the Jersey "Fairlawne Hussy," she beat the best of all other breeds with a yield of 47 lb. (with 5 per cent. butter-fat) 168 days after calving. She yielded in 47 weeks' lactation, 11,805 lb. of milk, containing (with 5 per cent.) 590¼ lb. of butter-fat, equal to (according to the Island of Jersey formula) 678¾ lb. of butter. She obtained silver medals in butter tests in 1919 and 1920, and a bronze medal in 1921, and in each of these years calved a full-time calf in February, thus showing that regularity of breeding has not been sacrificed to obtain high yields. In the great butter test at the R.A.S.E. Show at Derby in 1921, there were ninety-six entries including twenty-one Shorthorns, ten Lincolnshire Reds, ten British Friesians, eight Red Polls and twenty-nine Jerseys. The winner of first prize (and gold medal) was Bruce Ward's Jersey cow "Caper" (only 4½ years old) who gave 3 lb. 11 oz. of butter from 60 lb. of milk, eighty-two days after calving, making 63·20 points, nearly 20 points higher than any other cow. Her butter-fat was 5·525 per cent., and she won first prize in milking trials for Jerseys, and champion prize for Ayrshires, Guernseys and Jerseys. This great cow gave with her first calf 8861 lb. of milk, with her second 11,294, and achieved the Derby record in her third lactation. In 1920 the Godington herd of twelve cows averaged 8736 lb. of milk.

Three important sales by auction of Jerseys have taken place in England since 1907, those of J. H. Smith-Barry, Alexander Miller-Hallett, and Joseph Carson:—

Smith-Barry, as a breeder, had won in the show classes, and for some years he easily held the first place as a winner in the butter tests. At his sale in 1916 all but one of the forty-three animals had been bred by him. They averaged £117, a very high price at that time. At Miller-Hallett's sale in 1918, a large majority of the cows and bulls were Island bred. The forty-five realised the highest price yet obtained in a sale of Jersey cattle in England and averaged £172. Carson's sale in 1919 was remarkable for the prices obtained for the progeny of an Island-bred bull, the "Cid." American buyers bought most of them, and this bull was sold privately to go to America.

It is the usual practice to regard **the Jersey steer** as worthless for feeding, and discarded male calves are almost invariably slaughtered for slink veal. That the Jersey steer is, under certain circumstances, a useful feeding animal has been fully demonstrated by the Dukes of Bedford and others. The late J. B. Ellis of West Barsham, Walsingham, Norfolk, reared with satisfactory results from ten to fifteen male calves, which otherwise would have sold for only a few shillings. They were liberally fed, and the calf fat carefully conserved. Living without cover summer and winter, and consuming the same quality of food given to other breeds, they averaged about 40 stones imperial at two years old. The proportion of internal fat was large, and when the local butchers and their customers knew about it, top prices were obtained for the beef, which was of excellent flavour and texture, but irregular in colour. The flesh of not more than 10 per cent. of the animals was yellow, though not the deep yellow of Guernsey beef.

SCALE OF POINTS FOR JERSEY COWS, arranged by Royal Jersey Agricultural and Horticultural Society

PERFECTION—100.

Articles.		*Points.*
1.	*Head* fine ; *face* dished ; *cheek* fine ; *throat* clean	4
2.	*Nostrils* high and open ; *muzzle* encircled by a light colour[1]	2
3.	*Horns* small and incurving ;[2] *eye* full and placid	2
4.	*Neck* straight, thin and long, and lightly placed on the shoulders	5
5.	*Lung capacity*, as indicated by width and depth through body immediately behind the shoulders	3
6.	*Barrel* deep, broad and long, denoting large capacity ; *ribs* rounding in shape	10
7.	*Back* straight from withers to setting of tail ; *croup* and *setting on* not coarse	6
8.	*Withers* fine, and not coarse at *point of shoulders*	4
9.	*Hips* wide apart, rather prominent and fine in *bone*	2
10.	*Hind legs* squarely placed when viewed from behind, and not to cross or sweep in walking	2
11.	*Tail* thin, reaching the hocks, good *switch*	2
12.	*Udder* large, not fleshy, and well balanced	10
13.	*Fore-udder* full, and running well forward	10
14.	*Rear-udder* well up, protruding behind and not rounding abruptly at the top	8
15.	*Teats* of good uniform length and size, wide apart and squarely placed	7
16.	*Milk-veins* large and prominent	3
17.	*Richness*, as indicated by a *yellow colour* on *horns*, *escutcheon*, and inside of *ears* (the latter mostly an animal excretion which can be rubbed off)	3
18.	*Skin* thin, loose and mellow	4
19.	*Growth*	3
20.	*General appearance*, denoting a high-class and economical dairy cow	10

Additional special points extracted from the **scale of points for bulls**:—*Head* broad ; *eye* full and lively ; *muzzle* broad ; *neck* arched, powerful, and clean at the throat ; *withers* fine ; *shoulders* flat and sloping ; *loins* broad and strong ; *legs* rather short ; *rudimentary teats*, squarely placed and wide apart. A by-law makes it impossible for a bull to get a prize before he is a year old.

The whole form of a typical Jersey cow is handsome and deer-like, and, the shades of colour being bright and uncommon, Jerseys are, irrespective of their milking powers, favourite park cattle. Like all good dairy cows, Jerseys have a tendency, when milking heavily, to become too thin to appear to the best advantage, the production of rich milk being incompatible with putting on fat.

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[1] Now and then Jerseys appear with a few light spots on their black noses, in consequence, it has been asserted, of the relaxation in the early eighties of the laws relating to importing cattle and the introduction of a few Guernseys ; but without any material consequence to this breed. About 1845, Ayrshires and Shorthorns were tried, "with a view to improve the cattle," but with such unsatisfactory results that the progeny were all sent to the butcher.

[2] It is a common practice to set the horns of young animals that are not assuming a proper form during development. They are first drawn inwards and afterwards pulled down.

The milk, though not invariably abundant, is noted for a large proportion of cream of peculiarly rich quality and colour, which makes the cows favourites in many private household dairies throughout the country. A few are also kept in ordinary farm dairies, where specially rich milk is wanted; also as a guarantee against the milk of a herd falling below the legal minimum of 3 per cent. of fat and 8·5 per cent. of other solids; or, where butter is the manufactured product, to make the churning of the cream more easy, and to give the Jersey tint and flavour to the butter.[1] The whole milk is too rich for rearing calves, and separated milk and cream substitutes are more economical, and are used with more success.

The cows are extremely docile, owing to their being constantly tethered at pasture in the Island, while the bulls are more dangerous to strangers than bulls of other breeds—an objectionable feature which develops in the cows when reared in a state of nature under Argentine camp conditions. No doubt this unruly tendency is one explanation of the old custom on the Island of destroying bulls before they were three years old, though another reason advanced is that the bulls, while young, had so many cows put to them that they became used-up and worthless.

The general average of produce during the best part of the milking season may be stated at 8 to 12 quarts of milk per day, yielding from 7 to 9 lb. of butter per week, although occasionally there will be found individual cows which give rather more than double the average, *i.e.*, from 15 to 18 lb., and even 20 lb. of butter a week.

Thos. Quayle, in 1812, recorded 22 imperial quarts "as the greatest quantity of milk given in twenty-four hours, the medium quantity being 10 quarts—*i.e.*, 5½ gallons, with an average of 2½ gallons."

The milk averages of the cows at St Helier's Show, Jersey, in May 1904, were as follows:—

Number.	Days in Milk.	Milk.		Butter.		Butter. Ratio lb.	Points.
		lb.	oz.	lb.	oz.		
56 Prize-winners .	141	33	0¼	2	0½	16·18	40·91
93 other Cows .	136	31	6¼	1	11¼	18·36	34·62

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[1] Ernest Mathewes has advanced strong reasons why the Jersey should be regarded an ordinary rent-paying dairy cow, in a paper on "The Jersey Cow," read at a Congress of the British Dairy Farmers in Jersey, May 1905, to which indebtedness is acknowledged, see *B. D. F. Journal.*

PRIZE-WINNERS, TRING BUTTER TESTS AND MILKING TRIALS (FIVE YEARS, 1901 TO 1905).

Cows of any Breed or Cross, not exceeding 900 lb. Live-Weight. (*All Jerseys except these specially designated.*)

No. in Catalogue.	Exhibitor, Name of Cow, and Live-Weight in Lb.	Age.			No. of Days in Milk.	Total Milk Yield.		Butter Yield.		Ratio, viz., lb. Milk to lb. Butter.	No. of Points for Butter.	No. of Points for Lactation.	Total No. of Points.	Prizes.* Butter Test.†	Prizes.* Milk Test.‡	
		Y.	M.	D.		LB.	OZ.	LB.	OZ.						Points.	
	1901.															
10	D. Mutton's "Primrose Day" (898 lb.)	7	2	0	67	49	14	2	7¾	20·07	39·75	2·70	42·45	3rd	..	1st
25	Capt. Smith-Neill's "Tuddie's Queen" (863 lb.)	8	2	0	67	47	1	2	11¼	17·41	43·25	2·70	45·95	1st and (2).	..	2nd
23	Hon. Mrs Murray-Smith's "Lorna" (847 lb.)	8	5	0	187	37	2	1	6¼	26·69	22·25	12·00	34·25	..	..	3rd
24	Hon. Mrs Murray-Smith's "Dahlia" (764 lb.)	8	4	0	136	36	10	1	5½	27·25	21·50	9·60	31·10	..	..	4th
7	Viscount Enfield's "Gloaming 4th" (885 lb.)	7	8	0	130	34	11	2	2	16·32	34·00	9·00	43·00	2nd	..	..
6	J. R. Corbett's "Em" (898 lb.)	9	4	0	125	31	9	1	15	16·29	31·00	8·50	39·50	4th	..	..
	1902.															
18	Hon. Mrs Murray-Smith's "Dahlia" (812 lb.)	9	3	0	166	36	10	1	7¼	25·20	23·25	12·00	35·25	..	48·62	1st
21	Capt. Smith-Neill's "Tuddie's Queen" (845 lb.)	9	2	10	108	41	4	2	13¾	14·42	45·75	6·80	52·55	1st and (2).	48·05	2nd
10	Lady de Rothschild's "Lesser Daisy" (813 lb.)	7	6	8	121	38	10	1	13¼	21·12	29·25	8·10	37·35	..	46·72	3rd
7	Dr Watney's "Aurelius' Shrub" (887 lb.)	3	8	15	113	39	6	2	1½	18·80	33·50	7·30	40·80	3rd	46·67	4th
28	W. C. Cooper's "Havering Glorissa" (879 lb.)	5	2	11	166	34	1	1	14¼	18·01	30·25	12·00	42·25	2nd	46·06	..
26	F. Bedford's "Dora" (871 lb.)	3	6	0	168	28	10	1	10½	17·28	26·50	12·00	38·50	4th	40·62	..
	1903.															
37	Dr H. Watney's "Sharab" (874 lb.)	6	6	18	47	51	0	2	6¾	21·05	38·75	0·70	39·45	..	51·70	1st
53	Lord Rayleigh's "Rachel" (Guernsey, 861 lb.)	4	6	0	146	40	4	2	2	18·82	34·00	10·60	44·60	2nd	50·85	2nd
15	Mrs M'Intosh's "Forget-me-not" (795 lb.)	3	11	27	176	38	3	2	2¼	17·83	34·25	12·00	46·25	1st and (3).	50·18	3rd
30	The Bishop of Ipswich's "Oxford Dewdrop" (847 lb.)	6	4	9	106	43	5	2	2	20·38	34·00	6·60	40·60	3rd	49·91	4th
19	J. Joice's "Oxford Sunrise" (898 lb.)	5	2	3	177	32	15	1	12½	18·49	28·50	12·00	40·50	4th	44·93	..
	1904.															
48	Capt. Smith-Neill's "Doctor" (Cross-bred, 864 lb.)	16	0	0	85	63	1	1	5¼	47·48	21·25	4·50	25·75	..	68·10	1st
46	Lord Rayleigh's "Rachel 2nd" (Guernsey, 863 lb.)	6	0	0	146	40	15	1	11¼	24·03	27·25	10·60	37·85	..	51·53	2nd
18	Lady de Rothschild's "Witch" (840 lb.)	4	2	20	165	38	15	2	2¾	17·92	34·75	12·00	46·75	1st	50·93	3rd
25	Capt. Smith-Neill's "Viola's Beauty" (888 lb.)	8	10	14	165	37	9	1	14¼	19·86	30·25	12·00	42·25	..	49·56	4th
14	J. Smith-Barry's "Nimble" (862 lb.)	3	0	0	141	30	5	2	4½	13·28	36·50	10·10	46·60	2nd	40·41	..
4	Lady Smyth's "Louisiana Loo" (812 lb.)	4	0	11	130	29	15	2	2½	13·88	34·50	9·00	43·50	3rd	38·93	..
	1905.															
42	Capt. Smith-Neill's "Doctor" (Cross, 860 lb.)	20	0	0	81	64	12	2	3½	29·18	35·50	4·10	39·60	..	68·85	1st
8	Lady de Rothschild's "Lady Dora" (898 lb.)	6	0	0	205	42	6	2	7	17·38	39·00	12·00	51·00	2nd	54·37	2nd
35	Dr Watney's "Violette" (896 lb.)	8	0	0	136	44	12	2	9¾	17·14	41·75	9·60	51·35	1st and (2).	54·35	3rd
23	Capt. Smith-Neill's "Geraldine" (856 lb.)	4	9	18	158	42	0	1	12½	23·57	28·50	11·80	40·30	..	53·80	4th
21	The Bishop of Ipswich's "Oxford Dewdrop" (889 lb.)	8	3	9	121	44	6	2	4	19·72	36·00	8·10	44·10	3rd	52·47	..
32	J. Joicey's "Justitia" (895 lb.)	3	2	21	111	30	4	2	4¾	13·17	36·75	7·10	43·85	4th	37·35	..

Cows of any Breed or Cross, exceeding 900 lb. Live-Weight. (*All Jerseys except those specially designated.*)

	1901.														
57	Lord Rayleigh's "Trefoil" (1393 lb.)	6	0	0	79	72	10	2	9½	28·00	41·50	3·90	45·40	3rd	..	1st
51	W. Nisbet's "Lady" (Cross, 1065 lb.)	4	0	0	59	58	10	3	6	17·37	54·00	1·90	55·90	1st	..	2nd
63	J. F. Spencer's "Model Mary" (Shorthorn, 1568 lb.)	6	0	0	11	59	6	2	8¼	23·60	40·25	..	23·00	..	..	3rd
53	A. Bonest's "Buttercup" (Shorthorn, 1254 lb.)	8	0	0	30	54	12	1	12	31·28	28·00	..	28·00	..	..	4th
39	Dr H. Watney's "Lady of the Sunny Isles" (926 lb.)	9	5	0	125	45	6	2	5¾	19·23	37·75	8·50	46·25	2nd and (1).	..	..
46	D. Mutton's "Miss Lucy 2nd" (1028 lb.)	6	11	0	156	41	4	2	1¼	20·15	33·25	11·60	44·85	4th and (3).	..	..
	1902.														
57	J Evens's "Burton Margaret" (Lincoln, 1617 lb.)	7	0	0	69	75	0	2	10½	28·23	42·50	2·90	45·40	..	77·90	1st
61	A. Bonest's "Buttercup" (Shorthorn, 1275 lb.)	9	0	0	23	64	10	2	4¼	28·52	36·25	..	36·25	..	64·62	2nd
43	Dr Watney's "Sharab" (902 lb.)	5	6	19	128	53	14	3	9¾	14·92	57·75	8·80	66·55	1st and (1).	62·67	3rd
65	Lord Rayleigh's "Aconite" (Shorthorn, 1365 lb.)	6	0	0	36	62	8	1	15	32·25	31·00	..	31·00	..	62·50	4th
55	A. Merry's "Molly" (Shorthorn, 1393 lb.)	6	0	0	25	52	2	2	15¾	17·46	47·75	..	47·75	2nd	52·12	..
40	Viscount Enfield's "Gloaming 4th" (925 lb.)	8	8	0	138	35	14	2	4¾	15·61	36·75	9·80	46·55	3rd and (3).	45·67	..
42	Dr Watney's "Marryatt's Lass" (919 lb.)	8	7	29	203	36	12	2	2	17·29	34·00	12·00	46·00	4th	48·75	..
	1903.														
75	J. Evens's "Burton Nancy" (Lincoln, 1346 lb.)	6	6	0	36	66	0	3	1½	21·33	49·50	..	49·50	2nd	66·00	1st
93	A. Merry's "Judy" (Shorthorn, 1431 lb.)	6	0	0	184	50	12	1	11½	29·52	27·50	12·00	39·50	..	62·75	2nd
96	A. Bonest's "Buttercup" (Shorthorn, 1294 lb.)	10	0	0	29	62	4	2	8¾	24·44	40·75	..	40·75	..	62·25	3rd
77	T. Cundy's "Buttercup" (Cross, 1333 lb.)	6	0	0	148	50	0	2	5	21·62	37·00	10·80	47·80	4th	60·80	..
58	Dr Watney's "Violette" (926 lb.)	6	0	0	141	37	14	2	8	15·15	40·00	10·10	50·10	1st and (1).	47·97	..
60	Miss Standish's "St Helier's Princess" (930 lb.)	8	0	0	128	41	12	2	8½	16·49	40·50	8·80	49·30	3rd and (2).	50·55	..
76	J. Evens's "Burton Ruby Spot" (Lincoln, 1739 lb.)	6	10	0	33	61	10	2	6½	25·61	38·50	..	38·50	..	61·62	4th
	1904.														
78	R. W. Hobbs's "Rose 26th" (Shorthorn, 1476 lb.)	7	5	9	54	72	6	2	2¾	33·32	34·75	1·40	36·15	..	73·77	1st
77	J. Evens's "Burton Cross 2nd" (Lincoln, 1568 lb.)	6	11	20	29	71	12	2	9¼	27·83	41·25	..	42·15	..	71·75	2nd
75	T. Cundy's "Daffodil" (South Devon, 1363 lb.)	10	0	0	165	57	0	2	3¾	25·51	35·75	12·00	47·75	..	69·00	3rd
76	J. Evens's "Burton Fleet 2nd" (Lincoln, 1583 lb.)	7	11	0	38	66	4	2	1½	31·64	33·50	..	33·50	..	66·25	4th
54	Dr Watney's "Blackberry" (917 lb.)	5	0	26	126	37	10	2	15¼	12·74	47·25	8·60	55·85	1st and (1).	46·22	..
52	Dr Watney's "Red Maple" (1031 lb.)	7	11	14	97	55	2	2	12	20·04	44·00	5·70	49·70	2nd and (2).	60·82	..
53	Dr Watney's "Violette" (901 lb.)	7	0	0	98	47	8	2	11¼	17·57	43·25	5·80	49·05	3rd and (3).	53·30	..
55	Lady de Rothschild's "Freak 3rd" (948 lb.)	10	10	11	188	35	14	2	4¼	15·83	36·25	12·00	48·25	4th	47·87	..
	1905.														
68	J. Evens's "Buttercup" (Shorthorn, 1316 lb.)	6	0	0	40	71	0	2	8½	28·04	40·50	..	40·50	..	71·00	1s
70	W. Arkell's "Roan Latton" (Shorthorn, 1466 lb.)	8	0	0	61	62	0	1	11¾	35·74	27·75	2·10	29·85	..	64·10	2nd
45	Dr H. Watney's "Red Maple" (1059 lb.)	8	11	21	110	56	12	2	12¼	20·51	44·25	7·00	51·25	2nd and (3).	63·75	3rd
57	W. R. Wilmer's "Magpie" (Cross, 1053 lb.)	5	1	6	94	53	2	1	10½	32·07	26·50	5·40	31·90	..	58·52	4th
46	Dr Watney's "Guenon's Lady" (1125 lb.)	6	3	18	138	39	12	2	11½	14·62	43·50	9·80	53·30	1st and (1).	49·55	..
48	The Bishop of Ipswich's "Lady Teasle" (952 lb.)	8	6	3	115	48	10	2	8¾	19·09	40·75	7·50	48·25	3rd	56·12	..
50	Admiral Hon. T. S. Brand's "Rosina" (969 lb.)	4	9	0	74	35	14	2	10½	13·50	42·50	3·40	45·90	4th	39·27	..

* PRIZES FOR MILK OR BUTTER.—1st, £20; 2nd, £15; 3rd, £10; 4th, £5. (1). E. Jersey Cattle Society's Gold Medal; (2). E.J.C.S. Silver Medal; (3). E.J.C.S. Bronze Medal.

† BUTTER TEST.—Scale of Points: One point for every ounce of butter, and 1 point for every ten days after calving, deducting the first forty days. Fractions worked out by decimals. Maximum points for period of lactation, 12.

‡ MILK TEST.—Scale of Points: One point for every pound of milk, 1 point for every ten days after calving, deducting first forty days. Fractions worked out in decimals. Maximum points for period of lactation, 10. Cows must give 3 per cent. butter-fat.

ERNEST MATHEWES, *Judge*.

At the butter test in October, fifty-four cows competed, and the records of the three firsts were:—

Name of Owner and Cow.	Days in Milk.	Milk.		Butter		Butter. Ratio	Points.	Award.
		lb.	oz.	lb.	oz.	lb.		
C. Syvret, "Sandgirl" .	135	36	0	3	2¾	11·34	60·25	Gold Medal.
C. Mourant, "Cora 4th" .	65	42	12	3	3¾	13·21	54·25	Silver Medal.
Do., "Oxford Ixia 3rd" .	94	45	12	2	15¼	15·49	52·65	Bronze Medal.

In the World's Fair 120 days' **test at St Louis in** 1904, supervised by Professor Farington, 25 Jersey cows, during 90 days, made the following average daily record per head: 42·85 lb. of milk, yielding 1·95 lb. of fat, or 4·57 per cent. of fat and 8·80 per cent. of solids-not-fat. During the full period of 120 days, they yielded a grand total of 124,524 lb. of milk, which produced 5810 lb. of butter-fat. By **adding one-sixth** to the fat to find the commercial butter produced, this amount works out to about 270 lb. of butter per cow, or a little over 2¼ lb. per day. Of the 74 cows in competition (5 Swiss, 25 Jerseys, 15 Dutch, and 29 Shorthorns), 33 "produced sufficient fat in their milk to make an average of 2 lb. or more of butter daily" during 120 days. Of these, 21 were Jerseys, 10 Dutch, 1 Shorthorn, and 1 Swiss.

As the accompanying table shows, the Dutch in milk production were an easy first, the Swiss 2nd, Jerseys 3rd, and the Shorthorns last. The Jerseys, as butter-fat producers, were first, the Dutch 2nd, Swiss 3rd, Shorthorns last. The greatest amount of solids-not-fat was produced by the Dutch cows. The table gives an example of figures published at the end of each ten days during the dairy test at the World's Fair at St Louis:—

Number of Cows.	Average Milk per Cow per day.	Average Fat Test.	Average Butter-fat per day per Cow.	Average Solids-not-fat per day per Cow.
	LB.		LB.	LB.
Jerseys, 25 . . .	37·5	5·11	1·91	3·40
Dutch, 15 . . .	50·2	3·45	1·73	4·12
Shorthorns, 29 .	29·8	3·78	1·12	2·63
Swiss, 5 . . .	39·0	3·85	1·50	3·54

The cost of foodstuffs consumed to produce one pound of butter-fat was estimated at 13·51 cents for a Dutch cow, 10·56 cents for a Jersey cow, and 14·67 cents for a Swiss cow. The cost of food producing one pound of milk was estimated at ·536 cents for a Dutch cow, and ·58 cents for a Jersey.

In the **Jersey-Holstein** trials the averages per cow per day were :—

	Jerseys.	Holsteins.
Milk	43·38 lb.	53·4 lb.
Cost of feed . . .	24·5 cents	28·6 cents
Net profit (Class B) . .	48·94 „	39·0 „

The result of the St Louis competition for the economic production of milk was, that of the first five cows a Jersey was first and champion, a Holstein was second, and Jerseys were third, fourth, and fifth.

At the **World's Fair in Chicago** in 1893, 25 Jersey cows were tested for 90 days. A comparison of the results got during that time with the results obtained in a similar period at St Louis, shows a marked improvement in the Jersey breed in America within eleven years.

Average yield of milk per head per day at St Louis . .	42·85 lb.
„ „ „ „ Chicago . .	32·66 „
„ „ butter-fat per head at St Louis . .	176·39 „
„ „ „ „ Chicago . .	140·64 „
„ „ fat per head per day at St Louis . .	1·95 „
„ „ „ „ Chicago . .	1·56 „
„ percentage of fat in milk at St Louis . .	4·57 „
„ „ „ Chicago . .	4·78 „
„ „ solids-not-fat at St Louis . .	8·80 „
„ „ „ Chicago . .	9·22 „

The results obtained by Jerseys in England at the milking trials of the British Dairy Farmers' Association are shown in the quantity and quality table at page 317, and may be compared with the results also stated of other breeds.

The Guernsey is an offshoot of the Normandy breed. It is a larger, stronger-boned animal, and coarser in appearance than the Jersey. It has not been bred with such care, and its outlines are not so regular or symmetrical. Prize-winning animals even go down in the back when standing; but as a supplement to good milking qualities—the sole outstanding possession of the Jersey beyond its good looks—the Guernsey possesses no mean capacity for beef-production when not giving milk. The meat is thought by uninitiated people not to be of first-rate quality, on account of being yellow in the fat, like that of a few Jerseys, but the flavour and texture of the beef are excellent. The objections raised to it are merely the result of prejudice, which will disappear with more intimate acquaintance. It would be strange if the natural animal colouring matter which is highly prized in the milk and butter should be a genuine objection to the quality of the meat. The largest cows belonging to the original old-fashioned type are to be found in the west of the Island. Both males and females are docile. Bulls are usually so massive in the neck that it is unsafe to tie them in the usual way. A rope or chain round the horns and through the nose-ring is found much more reliable (Plate LXXVII. B).

> "In some subtle way the Guernsey gives the practical farmer an impression of remarkable milking capacity. The quiet dreamy eyes, with their encircling golden rim, the glossy horns and hoofs, the orange colour of a skin as soft as velvet, the deep wedge-shaped shoulders, the long, prominent milk veins, and the large, deep, well-filled silken bag—all these features seem to carry conviction that the Guernsey is designed for the dairy industry. There is none of the nervousness about the Guernsey which makes some cows of other breeds such fickle performers at the pail.
>
> "In the Island the universal practice for years has been to tether grazing animals by means of iron tether pins, 8 to 10 inches long, with a chain about 16 feet long and a swivel attached to the chain or to the rope around the horns. The animals are moved every two or three hours, and only about 3 feet at a time, and while the main object of this is to enable them to eat off the grass remarkably clean, the practice has undoubtedly resulted in the breed being extraordinarily tractable and docile."

The colours of Guernsey cattle, the "fawn and whites" or "lemon and whites," are more "broken" than those of the Jersey, patches of white appearing on the predominating light yellow, brown, or fawn. The grey hair about the head of the Jersey is absent. The muzzle is flesh-coloured; in Guernsey, black when it does appear is not always objected to, but both English and American breeders are generally rigorous in their efforts to exclude dusky muzzles. In 1921 the cow in the Island with the highest record of butter-fat, 899 lb., had a black nose. The nostrils are more rounded and not so dilated as those of the Jersey. Black and brindled specimens, though few, having been nearly bred out, are said to be the hardiest and the best milkers.

The climate of Guernsey, with its northern aspect, is not so genial as that of Jersey, with its sunny southern exposure, and consequently the cattle are hardier, and more inured to cold on their arrival in England than those from Jersey. The latter, it is true, become acclimatised in a few years, and their descendants retain their hardiness, but they also lose the refined delicacy of skin and form, and become stronger in frame and altogether coarser. Some strains of Island-bred cows in high condition are too broad at the withers, but on their losing condition as a result of heavy milking, the shoulder-top becomes sharp, as it ought to be. Apart from these, poor-milking cows sometimes occur of a beefy type, and should not be used as breeders of keeping stock. Young animals ought not to be too highly fed, as this would tend to make them heavy and coarse. The calves are made to follow the cows at pasture to clean up what the cows reject.

Guernsey butter is considerably deeper in the shade of its yellow colour than Jersey butter, and 10 lb. to 12 lb. a week is a good return from a cow kept in an ordinary natural way. The richer hue, together with the possibility of selling the calves at a better price than Jersey calves, has raised the Guernsey in favour with dairy farmers in this country. A further inducement is the greater weight of the animal as compared with the Jersey, as it gives better results when dry and fed for beef. Yellow carcases found among American chilled beef are sent to be consumed in Guernsey, where the colour is not objected to, but on the contrary appreciated.

Calving heifers of good quality can be bought in the Island, after much parleying with the breeder owners, who are very wary and deliberate in making a transaction, and yearling bulls are readily available. Outstanding pedigree animals fetch high prices for exportation. By the statistical returns of June 1920 there were 7630 cattle in the Island, of which 4780 were cows and heifers in milk and in calf. The cattle entered in the *Herd Book* up to 1920 were: pedigree cows and heifers, 21,155; pedigree stock bulls 4526, and foundation cows 5302.

The breed, like many of the old Guernsey families, such as the De Garis, Allez, Mansell, and Blendel, has a record many centuries before William, Duke of Normandy, conquered at Hastings. The identical breed (not imported from the Islands in historic times) is to be found in several parts of Normandy; around Lisieux, William the Conqueror's birthplace, and especially near Isigny, where the cattle were scrupulously bred, the model Guernsey can be seen alike in every particular to its Island cousins. The **richness in cream**, and its colour—*there*, as in Guernsey, a *sine qua non*—were always points uppermost in the selection of breeding stock.

The **English Guernsey Cattle Society** was one of the pioneers in England in the institution of milk recording. It put into operation in 1913 a plan for the regular inspection of the cows of those of its members who appreciated the importance of regular and accurate statistics of the production of individual animals. In 1922 seventy-eight herds, comprising about 620 animals, were "under test." "Their owners weigh the milk daily and the Society's inspectors, who are responsible people, test the milk for butter-fat content at intervals of about two months." The butter test was adopted in advance of most Milk Recording Associations. Young stock, that are the progeny of cows whose daily yield is authentically registered, are keenly sought for.

Up to May 1922, over 700 certificates had been issued by the Society in respect of animals which had qualified for entry in the official list printed each year in the *Herd Book*. The minimum qualification is a yield, within the lactation period, of 6000 lb. of milk, or 250·5 lb. of butter-fat for a heifer two

NOTABLE PERFORMANCES OF GUERNSEYS IN ENGLAND.

Cow and Age.	Milk produced. Lb.	Per cent. of Butter-fat.	Butter-fat produced. Lb.	Qualifications for Entry.		Weeks in Milk.	Weeks in Calf.
				Milk. Lb.	Butter. Lb.		
"Itchen Polly" (6 years)	14728·75	4·94	727·60	10,000	360	47·5	30
"Itchen Verbena" (12 years)	13673·75	5·07	693·25	10,000	360	52	48
"Warbler" (17 years)	14912·75	4·55	678·53	10,000	360	52	31
"Donnington Honeymoon" (8 years)	12517·75	4·96	625·83	10,000	360	50·6	29
"Ladock Princess Mary" (3½-4 years)	10025·00	5·95	596·48	8480·94	318·40	50·4	33
"Merton Preel II." (4-5 years)	13462·00	4·43	596·36	9495·54	346·18	50·5	37·4
"Rushington Shamrock III." (7 years)	12021·75	4·85	583·05	10,000	360	51·5	36·1
"Bosistow Lemon Queen" (4-5 years)	11991·50	4·85	581·68	9480·94	345·78	50·2	35
"Romana 49th" (5 years)	11792·00	4·90	577·80	10,000	360	44·4	30·5
"Donnington Kate" (7 years)	10100·00	5·62	567·62	10,000	360	52	32
"Itchen Lily VIII." (6 years)	11097·00	5·07	562·61	10,000	360	49	34
"Orchid II. of Blunham" (5 years)	12578·50	4·38	550·93	10,000	360	43·1	31·1
"Princess of Caillioterie" (4½-5 years)	11542·75	4·76	549·43	9929·03	358·04	49	29·4
"Ladock Pride" (10 years)	10306·25	5·26	542·10	10,000	360	48	36·4
"Donnington Juno" (7 years)	10448·50	5·18	541·23	10,000	360	52	33·4
"Donnington Jane" (6 years)	10020·50	5·04	541·10	10,000	360	44	36
"Itchen Carnation III." (6 years)	11719·50	4·58	536·75	10,000	360	52	34
"Tregonning Fussie" (5 years)	11627·00	4·61	536·00	10,000	360	52	31
"Orchid 2nd of Blunham" (4½-5 years)	11415·75	4·68	534·25	9455·39	345·08	47	33·3
"Rowanberry VIII." (5 years)	10412·75	5·11	532·09	10,000	360	48	36·4
"Ladock Quaker Maid" (3-3½ years)	10145·05	5·24	531·59	7632·20	295·18	52	34·2
"Ladock Puritan" (3½-4 years)	10039·50	5·28	530·08	8388·08	315·86	43	37
"Donnington Dewdrop V." (3-3½ years)	10680·25	4·96	529·74	7661·40	295·98	46·1	30·2
"Lorely" (2 years 7 months)	10289·25	5·12	526·80	6872·6	274·3	49	33
"Wickham Fancy II." (6 years)	10395·75	4·97	516·66	10,000	360	39	31
"Primrose of Les Maux Marquis" (4-5 years)	11578·00	4·46	516·37	9555·5	347·82	49·6	35·5
"Romana 35th" (4-5 years)	10015·75	5·14	514·80	9932·6	358·1	50	36
"Fussy's Dora" (3½-4 years)	11614·00	4·43	514·48	8269·67	312·64	52	34
"Belladonna II. of the Ponchez" (2½-3 years)	10110·75	4·83	488·34	6676·88	271·54	52	39
"Rownham's Glorissa" (8 years)	10768·50	4·51	485·65	10,000	360	41	30

years old or under. As soon as the animal is over two years old she must produce an additional daily average of 3·65 lb. of milk and $\frac{1}{10}$ lb. of butter-fat to the quantity necessary for qualification, and this ratio continues until she is five years old, when the required amount will have reached 10,000 lb. of milk or 360 lb. of butter-fat. The records on page 246 are taken from the English Society's *Herd Books*, the result of tests of animals in England, conducted under ordinary working conditions, with the usual daily food, and without any attempt whatever at forcing the yield.

The records of the **Royal Guernsey Agricultural Society** show that on their native island the cows of the breed are little in advance of those in England in the quantity and excellence of their products. Subjoined are **records of leading cows** of the **Advanced Register** of the Guernsey Society up till July 1921 :—

Cow and Age.	Milk. Lb.	Average Per cent.	Butter-fat. Lb.	Requirements for entry. Lb.
"Valentine III." (5 years) . . .	15477·75	5·06	783·10	360
"Ruettes Beauty I." (9 years) . . .	14805·75	5·11	757·72	360
"Fanny III. of Le Port" (4 years) . .	12647·68	5·90	745·89	343·4
"Beauty of the Ruettes" (6 years) . .	14298·75	5·10	739·29	360
"Queen IV. of the Blicqs" (8 years) .	13978·00	5·21	738·30	360
"Nellie II. of the Croisée" (8 years) .	13157·00	5·51	724·84	360
"Fascination des Caches" (7 years). .	12962·25	5·56	720·98	360
"Flora of les Annevilles" (8 years) . .	13172·25	5·44	714·73	360
"Sylph's Pride III." (9 years) . . .	15965·50	4·46	711·42	360
"Beauty III. des Martins" (6 years) .	14171·25	5·35	709·08	360
"Braye Duchesse" (8 years) . . .	16340·25	4·34	708·58	360
"Sweet Briar of Bickleigh" (4 years) .	12944·75	5·40	698·54	327·6
"Flossie III. of La Croisée" (6 years) .	13662·00	5·07	692·22	360
"Daisy of Pleinmont" (6 years) . .	12141·06	5·58	676·81	360
"Daisy of the Friquet" (7 years) . .	12512·50	5·29	662·98	360
"Flora IV. of les Annevilles" (3 years) .	13823·25	4·76	651·49	291·2
"Cyrène d'Or" (5 years)	11438·50	5·58	637·70	360
"La Fleur du Jardin XII" (12 years) .	13831·75	4·52	625·11	360
"Blanchette II." (8 years) . . .	13003·19	4·78	621·58	360
"Wide Horn" (14 years). . . .	13079·00	4·75	621·44	360
"Sequel's Bountiful" (5 years) . .	11963·25	5·15	613·92	360
"Lady Blanche II. of Bickleigh" (5 years)	12823·00	4·79	613·66	360
"Florrie of the Pailloterie IV." (5 years) .	10403·60	5·88	609·69	360
"Betsy V. of the Ponchez" (5 years) .	11388·75	5·35	608·95	360
"Minnie of Bickleigh" (8 years) . .	12700·25	4·76	605·63	360
"Brickfield Beauty II." (8 years) . .	10913·69	5·52	602·59	360
"Medea of Park Farm" (10 years) . .	11650·50	5·15	600·60	360
"France XV." (17 years)	14693·00	5·07	745·71	360
"Primrose of Courtil du Ray" (6 years) .	14420·50	6·24	899·48	360
"Cora" (5 years)	12617·50	5·42	683·25	344·8
"Violet Clovelly" (4 years) . . .	12954·25	5·03	651·12	323·5
"Virtue II." (3 years)	10924·25	5·59	611·08	272·4
"Froome's Flora II." (3 years) . .	11766·50	5·35	628·99	270·7
"Dinah VII. of the Fountain" (8 years) .	13278·00	5·29	713·01	360

List of prominent breeders in the English Guernsey Cattle Society:—

Mrs R. C. Bainbridge, Eldfordleigh Plympton, Devon; T. R. Bolitho, Trengwainton, Hea Moor S.O., Devon; A. Chester Beatty, Calehill Park, Little Chart, Kent; F. S. W. Cornwallis, Linton Park, Maidstone; Viscount Falmouth, Tregothnan, Falmouth; G. F. Ferrand, Morland Hall, Alton, Hants; John C. Forster, Clatford Mills, Andover, Hants; Sir W. H. N. Goschen, Durrington House, Harlow, Essex; D. C. Haldeman, Hayes Street Farm, Hayes, Kent; Sir Everard A. Hambro, Hayes Place, Hayes, Kent; Arthur C. Harris, Donnington Manor, Chichester; E. R. Debenham, Bladen Dairy Farms, Briantspuddle, Dorchester; Mrs Jervoise, Herriard Park, Basingstoke; John A. Kay, Ravenscroft Hall, Middlewich, Cheshire; Sir Henry F. Lennard, Bart., Wickham Court, West Wickham, Kent; Mrs W. Howard Palmer, Heathlands, Wokingham, Berks; H .Fitzwalter Plumptre, Goodnestone Park, near Canterbury, Kent; Mrs Pratt Barlow, Lynchmere House, Haslemere, Surrey; Archdeacon Raffles, Flint, Nansawsan, Ladock, Cornwall; Sir James F. Remnant, Bart., The Grange, Hare Hatch, Twyford, Berks; Sir Joseph Tichborne, Tichborne Park, Alresford, Hants; E. J. Wythes, Copped Hall, Epping, Essex.

In the **United States of America** the greatest enthusiasm has been shown in the systematic demonstration of Guernsey excellence. There we find a cow giving 24,000 lb. of milk in a year and 1098 lb. of butter-fat. The following figures relate to **five leading cows** in each of four classes of the Roll of Honour of the American Guernsey Cattle Club, as at 1st November 1919:—

CLASS AA—FIVE YEARS OR OVER.

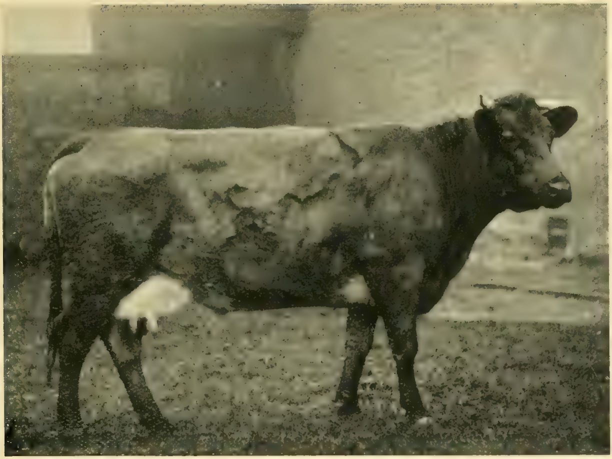
	Milk. Lb.	Butter-fat. Lb.
"Duchess Ruth" (47060 A. R. 3523)	14644·2	850·49
"Carwytham Queen" (41121 A. R. 4456)	15788·4	816·27
"Carrie of Hillhurst" (34864 A. R. 5973)	15307·8	814·83
"Ultra Lady" (38913 A. R. 3348)	14019·2	748·16
"Imp. Flora of City View" (59640 A. R. 7378)	13376·6	743·20

CLASS BB—FOUR AND A HALF TO FIVE YEARS.

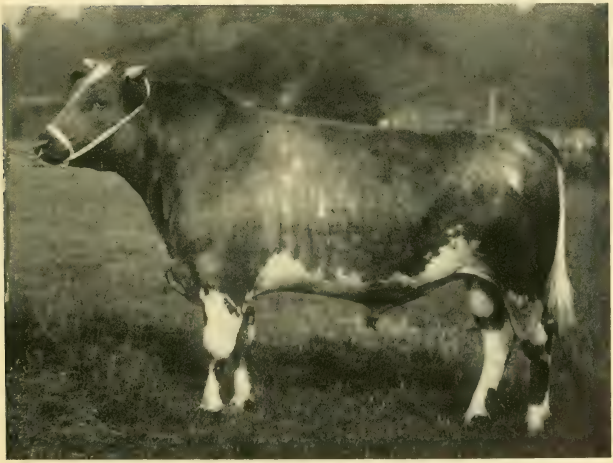
	Milk. Lb.	Butter-fat. Lb.
"Imp. Wyebrook Rose" (69245 A. R. 6186)	14872·1	710·21
"Susie of the Ridge" (43719 A. R. 4723)	12072·1	664·10
"Princess May of Linda Vista" (47711 A. R. 6019)	12232·7	627·48
"Colette Standish" (48426 A. R. 5517)	12822·1	603·85
"Nella Jay 6th" (55417 A. R. 5539)	12301·0	602·92

CLASS CC—FOUR TO FOUR AND A HALF YEARS.

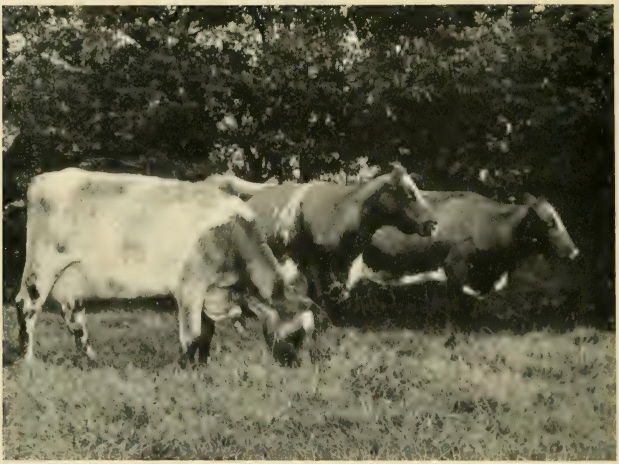
	Milk. Lb.	Butter-fat. Lb.
"Linden Girl of Harbor Hill 3rd" (58625 A. R. 4651)	15032·9	785·89
"Idyl of Koshkonong Place" (48151 A. R. 5684)	14466·3	685·98
"Cora of Gerar" (48309 A. R. 4706)	15368·8	665·04
"Donna May Fanchon of Linda Vista" (47709 A. R. 4878)	15037·7	635·90
"Belle of Canandaigna" (44832 A. R. 4534)	11965·0	616·05



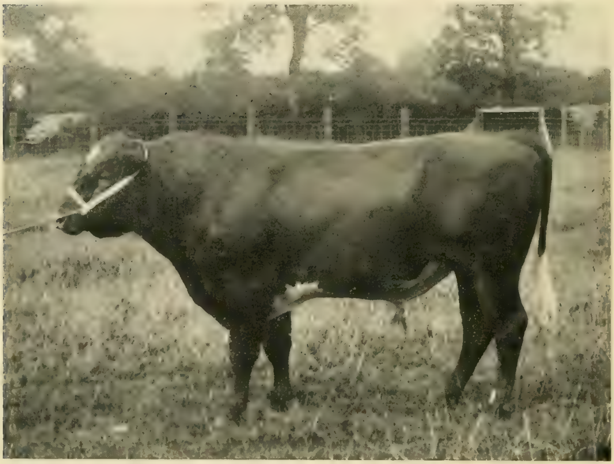
A. Blue Albion Cow—steel grey.



B. Blue Albion Bull, "Mountain Prince."
From E. Caudwell, Romsey Hall Farm, Derbyshire.

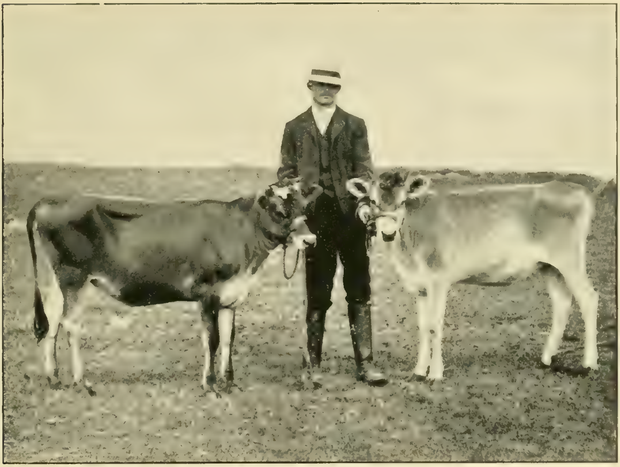


A. Maoile Cows—of the regenerated old Irish Polled Milking Breed. Bred by Major Murray.

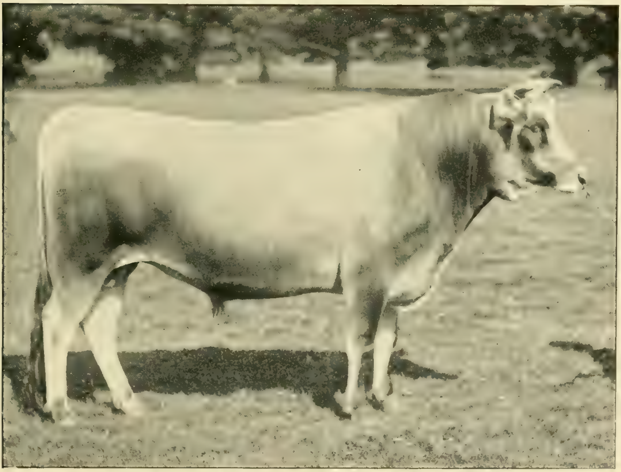


B. Maoile Bull, "Safeguard."
Major Murray's first hornless bull, out of "Nancie," a foundation hornless cow of unknown breeding.

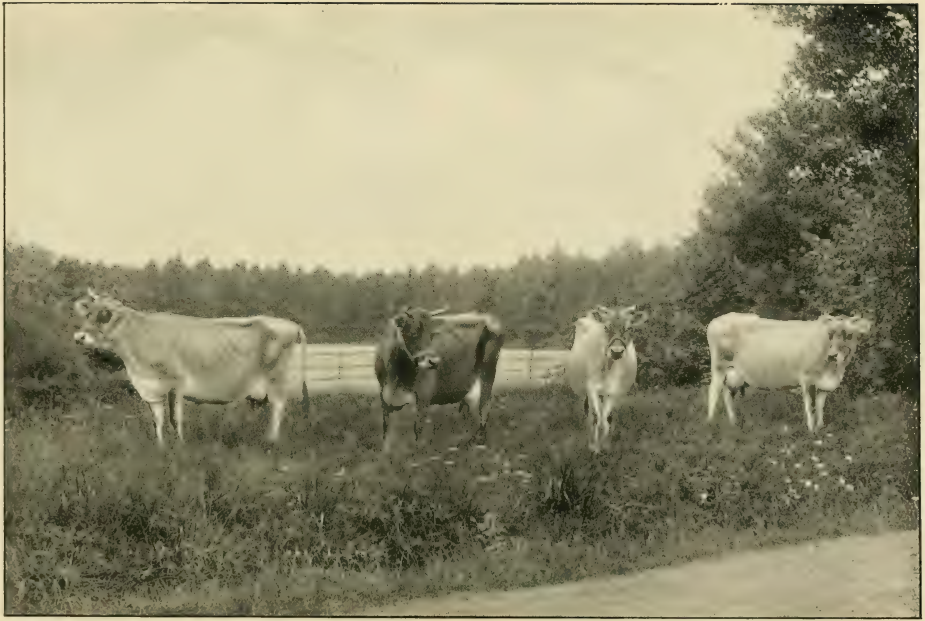
PLATE LXXV



A. Jersey Heifer Calves, "Doreen" and "Maisonette Blanche."
Two Firsts, Staffs County Show, 1904.
Owned by Captain L. G. Gisborne, Allestree Hall, Derby.
[*G. H. Parsons, Alsager.*



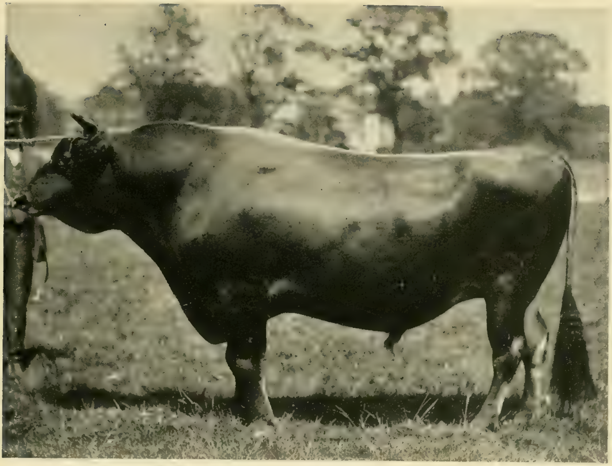
B. Jersey Bull, "Distinction's Pride" (1486), I.H.B., H.C.
First, R.A.S.E. Show, Warwick, 1892.
Owned by Sir James Blyth, Wood House, Stansted.



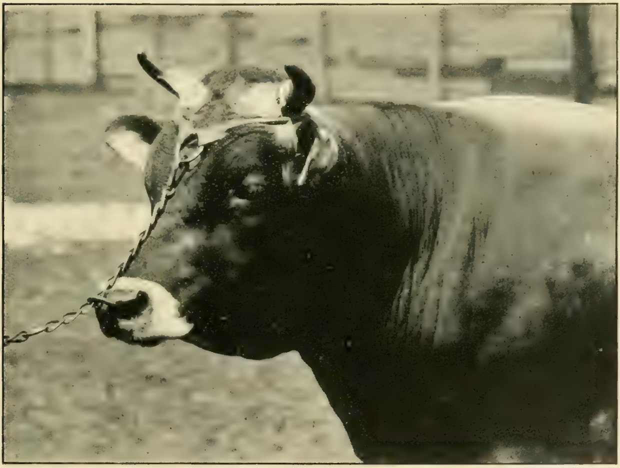
COWS OF THE BUCKHOLD HERD, OWNED BY DR H. WATNEY.

1. "VIOLETTE." Two Gold Medals. Island Bred. 3 lb. of butter in 24 hrs. at a public show. 2. "BLUE BELL. Three Gold Medals. Bred in England. 3. "SHARAB." Four Gold Medals. Bred at Buckhold. 56 lb. of milk in 24 hrs. On another occasion 3 lb. $9\frac{3}{4}$ oz. butter in 24 hrs. at a public show. 4. "RED MAPLE." Four Gold Medals. Bred at Buckhold. 112 lb. of milk in 48 hrs. at a public show.

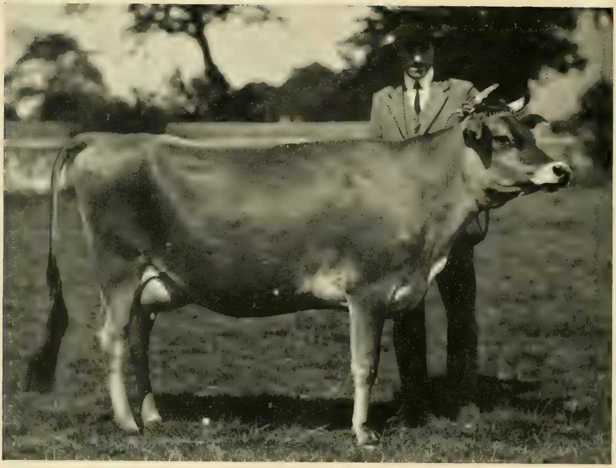
[S. *Victor White, Reading, England.*



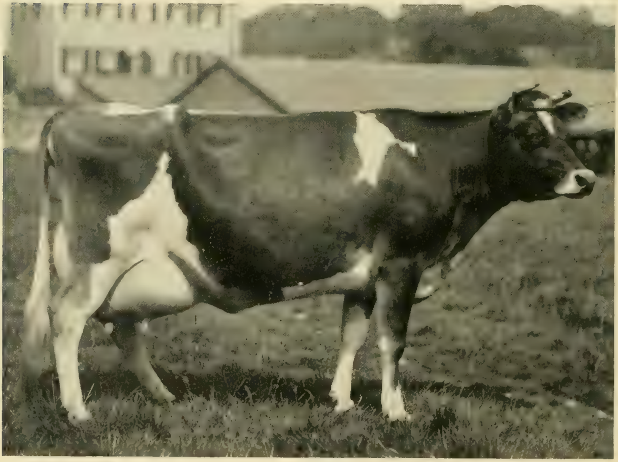
A. Jersey Bull, "Masterman of Oaklands.
Bred in the Island.



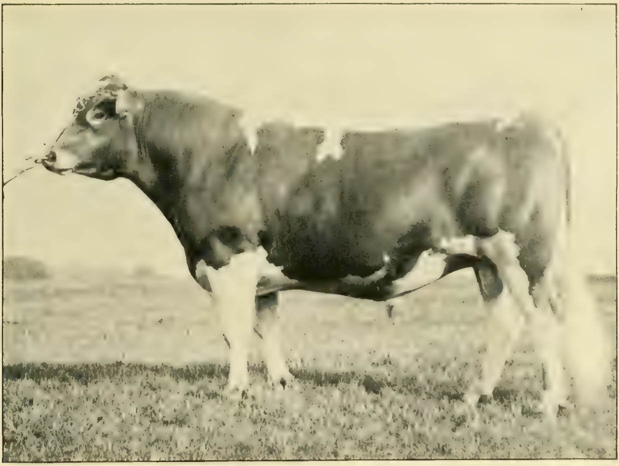
B. Head of a Typical Jersey Bull, "Glorious Lad."
Owned by Captain Gisborne, Allestree Hall, Derby.
[*G. H. Parsons, Ilsager, Cheshire.*



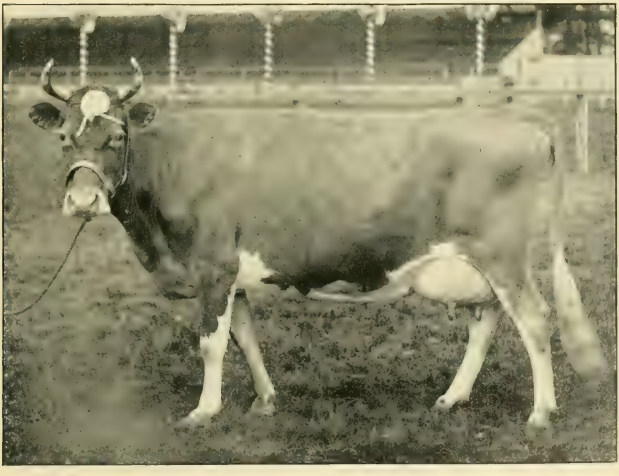
A. JERSEY COW, "BLONDIS MATCHBOX."
Bred in the Island.



B. JERSEY COW, "AGATHAS PAUOLA 2ND."
Bred in the Island.

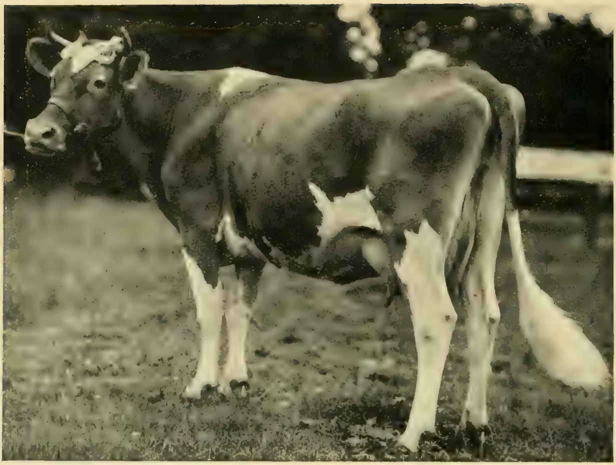


A. GUERNSEY BULL, "CLIMAX" (14), E.G.H.B.
Winner of one championship and seven 1st prizes.
Owned by the Express Dairy Company, Limited, College Farm, Finchley.

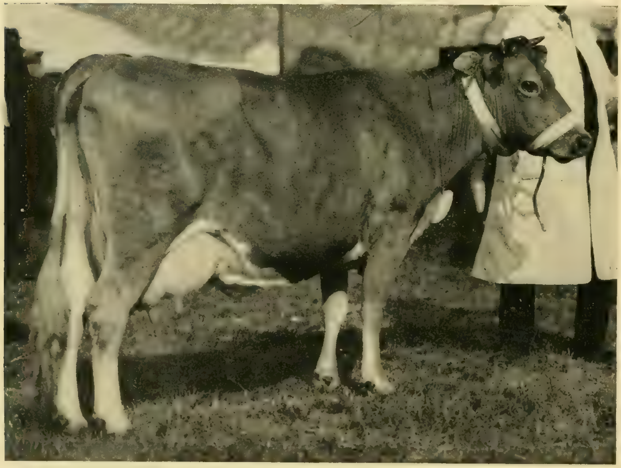


B. GUERNSEY COW, "QUEEN OF THE ROSES."
A great prize-winner, including first at London Dairy Show, 1904, and first at B. and W. Show, 1905.
Owned by E. A. Hambro, Haynes Place, Kent.

[*G. H. Parsons, Alsager, Cheshire.*



A. GUERNSEY COW, "DAISY'S BUTTERCUP OF MOUNT PLEASANT," at 5 years 2 weeks.
Owned by E. J. Wythes, Copped Hall, Epping. Reserve Champion Chelmsford.
[*"Agricultural Gazette Photograph.*



B. GUERNSEY COW, "TREGYE CORA," born July 1912.
Owned by G. Blight, Broge. First at the B. & W., 1922.
[*"Agricultural Gazette Photograph."*

CLASS DD—THREE AND A HALF TO FOUR YEARS.

	Milk Lb.	Butter-fat. Lb.
"Clare of Gerar" (49122 A. R. 4733) . . .	13782·9	637·79
"Dairymaid of Nelsonville" (50051 A. R. 6852) .	12068·8	590·36
"Enchantress of Dellwood" (56697 A. R. 5945) .	11617·9	586·58
"Diantha of Two Rivers" (52328 A. R. 6391) . .	12189·6	584·61
"Imp. Wintershill Meg 2nd" (48506 A. R. 3824) .	12347·2	583·33

The average yield of 70 class leaders was 11,772·67 lb. of milk, 592·05 lb. of butter-fat, or 5·03 per cent.

SUMMARY OF 731 AMERICAN DOUBLE LETTER RECORDS.

	Records.	Milk. Lb.	Butter-fat. Lb.	Per cent.
Class AA	203	9756·61	479·70	4·916
Class BB	60	9123·86	459·54	5·036
Class CC	83	8761·83	444·71	5·075
Class DD	64	8136·92	415·76	4·925
Class EE (3 to 3½ years) . .	78	7884·22	398·31	5·051
Class FF (2½ to 3 years) . .	91	7505·80	386·74	5·150
Class GG (2 to 2½ years) . .	152	7097·86	363·05	5·099
Average for . .	731	8417·09	423·96	5·036

In 1918 there were in the United States 278 breeders of Guernseys who were testing 1235 cows; in 1919 there were 344 breeders testing 1478 cows. During 1918-19 1100 Advanced Register records were made which raised the average for the breed by 55·46 lb. of milk and 2·15 lb. of butter-fat. The increased demand for cattle and the continued increase in the producing ability of the breed, as shown by the yearly tests, have brought about in the United States much higher prices for stock.

The Advanced Register of the American Guernsey Cattle Club for 1919 contains the names of 70 animals at the head of seven classes for age. The average yield of these cows is 15,215·48 lb. of milk, say 1521 gallons, with 794·83 lb. of butter-fat, and an average content of butter-fat of 5·22 per cent. In England the eight highest yields recorded by the English Guernsey Cattle Society in 1918 give an average of 12,916 lb. milk, or about 1291 gallons; 634·8 lb. of butter-fat, and an average yield of butter-fat of about 4·94 per cent.

The following is a **list of prominent present-day breeders** in the Island of Guernsey:—F. Belloir, Vimiera, St Peter Port; F. W. Browning, Les Epérons, St Andrews; G. J. Browning, Saint's Farm, St Martins; A. Camp, Mill House, Vrangue; G. H. Froome, School Lane Farm, St Martins; T. R. Gallienne, Ponchez, Castel; E. De Garis, Myrtle Place, Castel; G. E. De Garis, St Leddards, Castel; H. Hamley, Bickleigh Farm, St Sampson's; A. J. Hocart, Les Blancs Bois, Castel; C. Kitts, 19 Smith Street, St Peter Port; E. P. Mahy, Maple Lodge, Vale; J. W. Martel, Préel, Castel; P. Martel, jun., Hunguet's Farm, St Andrews; O. J. le Page, Le Briquet, St Saviour's; A. le Patourel, La Ramée, St Peter Port; J. Allés Simon, Les Rouvets, St Saviour's.

For cheese-making purposes, the milk of the Islands cow, owing to the large size of the cream globules, has generally been considered not so suitable as the milk of the Ayrshire or the Shorthorn.

A successful **Guernsey herd**, the property of J. Maconochie Wellwood, was maintained for a good many years as far north **in Scotland** as Meadowbank Home Farm, Kirknewton, Midlothian, for the supply of milk of superior quality for a West-End trade in Edinburgh, the milk being conveyed by cart a distance of ten miles morning and evening, except during the summer months when people are on holiday. It was started in 1891 with 22 cows and calves, and it grew in numbers to 116 of all ages. The late P. D. Ozanne's bulls were got from Guernsey. The heifer calves were reared, and after the first winter they were hardy enough to be out in the open in a sheltered field until they came into profit about two years old. They gave on an average annually from 700 to 750 gallons of milk, containing 8 oz. of butter-fat per gallon. The daily food of a cow in full milk consisted of about 100 lb. of turnips, 8 lb. of dried grains (with 3 or 4 lb. of pease meal) steamed, 6 or 7 lb. of hay at night, and straw *ad libitum*.

The following information has been culled from the **opinions of Guernsey breeders** thought worthy of publication by the English Guernsey Cattle Society. The best results are got by breeding from good utility strains and aiming at 1000 gallons of milk and 450 lb. of butter-fat after each calf—discarding "freak" milk-records of, say, 1500 gallons of milk and 700 lb. of butter-fat. To maintain the reputation of the Guernsey as "the best all-round breed for milk and butter in the world," and not to be underrated as a meat producer, size cannot be overlooked in breeding. Calves require to be kept in healthy surroundings, well fed, but not over pushed, and heifers must not be stocked too young. **D. C. Haldeman** says:—"Aim for big healthy cows and a steady production. Do not be afraid of fresh air. My place is 600 feet above the sea. In-calf heifers and dry cows winter in the open with a shed to go into for shelter, and I have never had a cow 'react.'" A Guernsey cow should make her best record when she is ten years old or more, if she has not been forced in previous years. "Good cows can go on breeding until they are twenty years old, or even more, if they are allowed to go easy. The Guernsey breed is not easily upset by changed surroundings. They acclimatise easily and invariably do far better at the pail away from home than in their own native island." It is authoritatively claimed that the breed holds the world's record "for production of the greatest amount of butter at the least cost." **R. E. Parker** records that "the best cows he saw in Cheshire were by Guernsey bulls out of the ordinary Shorthorn cows. The calves came big and strong and the cows grew up bigger with better udders and butter-fat than their dams."

As a live stock investigator in all parts of the world **the Author** has long felt that the Guernsey breed has not secured in popular estimation the position in competition with other dairy cattle and dual-purpose breeds that on its merits it should have taken; and in this he was in full concord with the late Ex-Governor Hoard, Editor and Proprietor of *Hoard's Dairyman.* Hoard kept a large herd of splendid Guernsey cows on his Home Farm, and made no secret to his most intimate friends that he chose the breed on its merits, and moreover, foretold a great future for it on the ground of high commercial dairy utility. Hoard's ideas are actually realised, for in Wisconsin (his State) and other Middle West dairying States, the Guernsey and Holstein breeds hold pre-eminent positions, the latter for cheese-making and the ordinary milk supply, and the Guernsey for creamery purposes and the production of milk of A1 quality. The Guernsey champion cow's 365-day record of the United States in 1914 was 19,639·5 lb. of milk, yielding 1059·59 lb. of butter-fat.

The Alderney section of the Channel Islands cattle is now absorbed by the Guernsey breed. The Alderney was originally formed by mingling Jersey and Guernsey blood. The cows are smaller than Guernseys, and at one time they were much darker in colour. No Alderney bulls are admitted into Guernsey, but only cows and heifers; and many of the Alderney cows of the day have been brought as calves from Guernsey; and Guernsey bulls are also taken by the Alderney State by permission of the Court of Guernsey.

CHAPTER XII

BREEDING AND MANAGEMENT OF CALVES

Management of Cattle—Calves—Methods of Rearing—Housing—Castration—Spaying—Diseases and Parasites—White Scour—Diarrhœa—"Husk" or "Hoose"—Coccidiosis—Ringworm—Lice—"Blackleg."

It is essential to the success of any system of management that good well-bred stock be employed, which need not, however, belong to highly prized or fashionable strains. To deal successfully in the latter is a special business requiring a high degree of skill and abundant capital such as few ordinary farmers possess, and involves in any case a considerable element of speculation. But apart from such fancy animals there is plenty of good stock available for the farmer working on ordinary commercial lines.

A calf should have its **mother's milk**, and that only, for the first five to eight days. "Beastings" or **colostrum**—the milk secreted during the few days after calving—is the best food for the calf, and it is unfit for other purposes. It frequently contains streaks of blood, especially in the case of first-calf heifers. Butter can be made from "green milk" rather sooner than cheese, but it is a mistake to use milk from newly-calved cows for any other purpose than that of feeding their calves, until it becomes normal in composition and will boil without coagulation.

The following is an *analysis* of average colostrum and cows' milk:—

	Colostrum (1st Day)	Cows' Milk (Average)	Solids (Normal Milk) per Gallon
Water	78·7	87·30	...
Butter-fat	4·0	3·75	6·0 oz.
Milk Sugar	1·5	4·75	7·6 oz.
Albumen	7·5	0·50	·8 oz.
Casein	7·3	3·00	4·8 oz.
Mineral ash	1·0	·70	1·1 oz.
	100·0	100·00	20·3 oz.

The specific gravity of colostrum is from 1·046 to 1·079 at 15° C. (59° F.), and averages 1·068.

Engling gives the following composition of colostrum :—

	Per cent.		Per cent.		Per cent.
Water . .	76·60	to	67·43	average	71·69
Fat . . .	1·88	,,	4·68	,,	3·37
Casein (?) . .	2·64	,,	7·14	,,	4·83
Albumen (?) .	11·18	,,	20·21	,,	15·85
Sugar . .	1·34	,,	3·83	,,	2·48
Ash . . .	1·18	,,	2·31	,,	1·78

Colostrum, having about five times as much albuminoid as ordinary milk, is an extremely nourishing food; and having, moreover, a markedly laxative effect, it is peculiarly suited to the wants of the new-born calf. Normal milk is an unsatisfactory substitute. Where its use for young calves is unavoidable, it is necessary to administer a small dose of laxative medicine such as castor oil.

There are Three Common Methods of rearing Calves :—1st. *The natural method* of allowing the calf to suck its own dam. This produces the best calves for the showyard or for fattening, but it is expensive, and the calves grow up wild unless frequently handled. This is the normal method in herds of pedigree beef cattle, the only common modification of it being that bull calves intended for show or sale are frequently given deep milking foster-mothers as soon as their own dams begin to fall off in milk. For the production of commercial cattle, the method is necessarily confined to districts where plenty of cheap rough grazing is available, and where the cost of maintenance of the cow can be kept low. In the upland districts of Scotland, West Highland cows mated to bulls of their own breed, or crossed with the Shorthorn, or again, Galloway cows crossed, preferably with white Shorthorn bulls, produce excellent calves on this system and can do so quite profitably. If fairly low-lying and sheltered fields are available, the cows may run outside during the whole winter, receiving no artificial feeding except a limited quantity of hay in very severe weather, or when the ground is covered with snow. They are frequently allowed to calve in the open, but housing for two or three weeks at this time is an advantage. Calves should be dropped about April for obvious reasons, and weaned about October in order to allow time for the cows to recuperate before severe weather arrives.

The natural method of rearing is also sometimes used as part of an intensive system of "baby beef" production. Aberdeen-Angus cows, for example, may be employed, mated either with bulls of their own breed or with white Shorthorns. In this case the cost is necessarily greater, as the cows require to be housed and fed on roots and straw for part of the winter. Consequently every effort must be made to produce a calf of great commercial value if the system is to be financially successful. Calves in this case should be dropped earlier, in order that they may have the full benefit of the ensuing grazing season. January and February are regarded as the best months. The young animals must be taught to eat considerable amounts of cake or other concentrates before weaning in autumn, and they must be intensively fed from that time until they are fit for the block, say at twenty or twenty-two months old. The essential feature of the system is that there is no differentiation into a "store" and a "fattening" period in the animal's life. It must be kept making the maximum rate of progress from birth till it is ready for the butcher. If a check is permitted to occur time is lost, and any probability of profit disappears.

2nd. *The semi-natural method* of permitting the calves to suck, but of rearing two or more on each cow. For the success of this system it is essential that fairly deep milking cows be used, and with carefully selected heavy milkers it is possible to make the system so intensive that an average of five or more calves per cow can be reared annually. Where it is desired to bring up only two on any one mother, as for example with first-calf heifers, or on indifferent grazing, the difficulties are reduced to that of "doubling on" the second calf. To facilitate this process, the cow's own calf should be removed as soon as it is dropped and only admitted to suck along with the other. If the cow proves refractory, the calves may be chained together in order to ensure them equal opportunities of sucking, but the practice is attended with some danger. A cow has been known to rise when the calves were one on each side, with the result that they were suspended by the chain passing over the cow's back, and hanged.

With the more intensive form of the system, relays of calves are put on. The first pair (or sometimes three) are weaned at about three months of age and are followed generally by two more. These are weaned in turn at about the same age, and ordinarily a single calf is put on for the remaining part of the lactation period. The system requires careful and skilled supervision.

The calves, it is found, are best kept in small paddocks or airy pens apart from the cows, which latter are brought in three times a day to suckle, when they are kept under supervision. The difficulties of the system are those of getting good calves as and when required, and of avoiding the introduction of disease, and too often a heavy death-rate. Newly purchased calves should be kept isolated as far as possible. Some cows, too, refuse to accustom themselves to the system and have to be disposed of, but generally they obtain quite a profitable market as dairy animals. As weaning is necessarily sudden and often rather abnormally early, care is necessary to ensure that the calves are well started to eat while still sucking, and the food after weaning must be easily digestible and nutritious.

3rd. *The artificial method* of rearing on the pail. Occasionally pail-fed calves receive fresh whole milk in full quantity and for a considerable time. Pure bred bull calves of the dairy breeds are frequently so treated in order to obtain full growth and development for sale. For the best quality of veal, too, whole-milk feeding is essential, although it is questionable whether the production of such a high quality is profitable. As a rule, however, the object of pail-feeding is to save milk or some of its more valuable constituents and so to diminish the cost of feeding. A gallon of whole milk may, according to feeding experiments, produce as much as 1½ lb. of live-weight increase in very young calves, but with increasing age the gain per gallon decreases to about one-third of this amount. It is obvious that where whole milk is marketable as human food, its use for calf feeding should be strictly limited and confined to the earliest period of the animal's life. A quart of its dam's milk three times a day is sufficient at first, to be increased at the end of the first week to about twice this amount, or one and a half gallons daily. After one or two weeks of such feeding the substitution of other foods may commence. This substitution should be gradual, and should be spread over a further period of two or three weeks.

On the whole, the most satisfactory food with which to replace whole milk is skim, or separated milk with an added butter-fat substitute. The prevailing idea up till quite recently was that the most satisfactory cream-substitute was something chemically similar to the butter-fat removed, and thus oils, cod-liver oil in particular, have been widely used. Equally satisfactory results have been obtained, as a matter of fact, with cotton-seed oil, which is generally much cheaper. But all oils are open to the objection that it is practically impossible to reduce them to such a fine state of emulsion as would simulate the condition of the butter-fat in milk, and that when fed in any quantity in a crude liquid state they produce digestive troubles. The quantity that can be safely fed is equivalent to only a fourth or a third of the amount of butter-fat that has been removed. More satisfactory results have been obtained with materials such as ground linseed which, though rich in oil, are free from the objection of crude liquid oil. Still better, however, and cheaper, are the ordinary cereal meals, in particular crushed oats, it having been demonstrated that the starch contained in such foods is a perfectly satisfactory substitute for the milk fat. The calves can be quickly taught to eat this if a handful be placed in the milk at first. Later it can be fed moistened with milk, and finally dry. About ¾ or 1 lb. per head per day should be fed from the time that the whole milk is entirely withdrawn.

It is essential to the success of this system that the milk be given as fresh as possible. There is no difficulty in the case of separated milk, which can easily be fed when still warm, but with the skimming system there is a common tendency to allow the milk to stand too long in order to obtain the full yield of cream. Such milk, even when not appreciably sour, is detrimental to the calf's health. Skim milk fed to calves should preferably be not more than twelve hours old.

Calves may be—(1) tied by the neck; (2) kept singly in small cribs; or (3) let run together, loose, in a large, dry, well-ventilated place. When loose they are liable to suck each other about the navel, and produce enlargement and often rawness of the part. To prevent this, calves are sometimes muzzled by putting on a bridle with sharp spines projecting upwards from the nose, to prick other calves and prevent them standing to be sucked. It is a good practice to give artificial food, such as finely ground cake, immediately after the meal of milk, to take up the attention of the calf until the strong instinctive desire to suck passes off. Hayracks and small boxes for cake should be fitted up on the side of the wall of the crib or calf-house at convenient heights.

In cheese dairies remarkably successful results have been obtained with **whey**, fed along with such materials as will satisfactorily replace the substances removed in the curd. It is necessary to bear in mind that not only the butter-fat but also the greater part of the albuminoids have been removed from the milk. Consequently it is necessary to feed something with the whey which supplies a considerable amount of albuminoid, more than is contained, for example, in the cereal meals. Palm-nut cake and linseed cake meals made into gruel have given satisfactory results. Whole-milk feeding should be rather longer continued in this case, and the change from that to the whey and substitute should be rather more gradual. Again, the whey should be fed as fresh as possible.

It frequently happens that the problem of calf rearing is not that of utilising skim milk or whey, but that of rearing as many as possible on a limited quantity of whole milk. Bruce[1] has found in practice that 100 gallons of whole milk for each calf can be made to suffice when supplemented with well-chosen and carefully prepared feeding stuffs. This permits the rearing of eight calves annually on a good deep milking cow. On his system, whole milk is fed at the rate of 1½ gallons daily from the first to the fourth week, after which the ration is diminished by ¼ gallon, at first fortnightly, and later every third week. A calf should be fed on its mother's whole milk for the four weeks; and when separated milk is gradually substituted, it should be fortified by 2 oz. per day of the best cod-liver oil, or a flax-seed mucilage prepared by hot water. The milk substitute used is a gruel consisting of about 2 lb. of meal made up with a gallon of boiling water, the meal consisting of one half ground linseed cake, one quarter ground linseed, and one eighth each of wheat parings and locust bean meal. A beginning is made with ½ gallon of gruel in the third week, and the quantity is increased as the milk ration decreases. Weaning is commenced at the thirteenth week and finished at the sixteenth.

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[1] "Cattle Rearing" by Wm. Bruce, B.Sc., *Transactions of the Highland and Agricultural Society of Scotland*, 1916.

Proprietary **cream and milk substitutes** are largely used in calf rearing. Most of the varieties that have been tried experimentally have proved quite good, and they have the advantage of convenience in feeding, especially where only a small number of calves has to be dealt with. Most of them, however, appear to cost more than home-made mixtures of equal value.

Calves should be given a small quantity of sweet hay from about the fourth or fifth week, and may begin to receive sliced roots, or to run on pasture, according to the season, very soon after. Concentrated foods, given in a dry state, should be commenced some time before weaning, and should be increased up to 1½ or 2 lb. per day soon after. The materials chosen should be of easy digestion and high nutritive value. Linseed cake, bran, and crushed oats are perhaps the best, and a mixture is generally preferable to a single feeding stuff. Cotton cake is unsuitable for calves, as for all young animals.

In the case of young cattle, a moderate amount of cake may be continued, say 2 or 3 lb. daily during the first winter, if straw be the fodder used. If plenty of good roots be given, the cake can be reduced or omitted.

Weak cattle, or those of a soft temperament (usually kept back from feeding by their neighbours and thriving badly), should be removed and placed apart.

Castration should be done when the calf is a month old; if much older, the animal ceases to thrive for a time. When the operation is not performed till strong masculine characteristics develop, the resulting steer (then called a "seg") is reduced in market value, owing to its bull-like appearance and supposed coarseness of flesh. Many cross-bred Irish bulls which, owing to the neglect of their breeders, who are usually small crofters, have missed castration, are best fed off when they get to two years old without being castrated. If they be finished at any period exclusive of the active breeding season, the flesh has no objectionable flavour, and sells at good though not top prices. To castrate a bull at this age may imply the loss of two months' feeding, unless the Indian process of *kutne* be introduced. By it the skin is not cut, but the seminal ducts are ruptured by a few taps of a rounded smooth stone on the strings of the testicles, the neck of the scrotum having been stretched over some solid smooth substance placed underneath (see *Indian Agriculture*, Wallace, p. 70).

Bulls should be taught to lead before they are a year old, either by "bull-dogs" or "humbugs," or by a ring put through the gristle dividing the nostrils. At a year they may serve heifers or small cows, but if not quite large enough should not be allowed to take an advantage, say on a hill-side or slope, as under such circumstances a bull is liable to fall and injure his back. Bulls are now more docile than of old, in a great measure due to their being more gently treated. When a bull develops bad temper, as some bulls do however well treated, he becomes worse with age, and should be fitted with **metal blinders**, after the style of the invention of White of Gospel House, Hall Green, Birmingham, which permit him to see to feed, to get about, and attend to the cows, but prevent all possible danger to the attendant or to the public at shows.

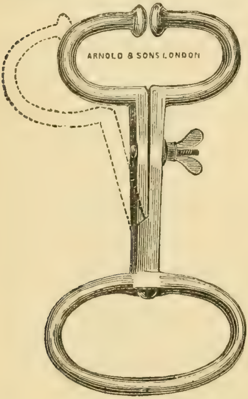

FIG. 10.—"BULL-DOGS" OR "HUMBUGS" WITH REGULATING SCREW.

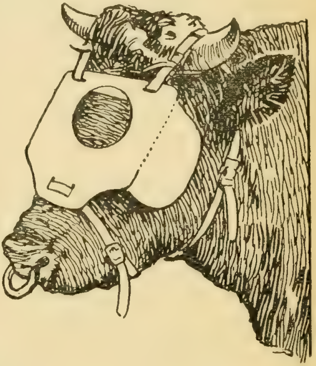

FIG. 11.—"BULL BLINDERS."

While at service they should be maintained in good store condition, and each may have daily, according to size, up to 6 or 8 lb. of mixed meal or bruised grain. With this they are usually more sure, and get better calves than when fed on cake.

Spaying of heifers that are not to be kept for breeding is best done between the ages of one and nine months. Old cows may be operated on with safety, even to within three weeks of calving. Cold, wet weather should be avoided, as well as a period when pastures are dry and the solid excrement hard. There are two methods of spaying: (1) Ovariotomy, in which the ovaries are extracted—a painful operation attended with hæmorrhage and often considerable mortality; (2) "Webbing," or severing the Fallopian tube and withdrawing the web-like structure, which has given origin to the name in common use in Australia—a safe, simple, almost painless process. The operation in adults involves a clean perpendicular slit in the skin, 4 inches long, nearer the hook-bone than the last rib on the left side. After the wound in the hide has been opened with the finger and thumb of the left hand, a slit in the tissue is made, not parallel with the first incision but inclining slightly from it to the right, 1¾ inch long, or just large enough to allow the insertion of three fingers, which on being twisted round procure the admission of the left hand and arm. When the Fallopian tube is reached two fingers are passed round the web, the hand is then turned and sharply withdrawn with the web adhering to the fingers. It is clear, however, from the experiments of physiologists, that whereas webbing could not

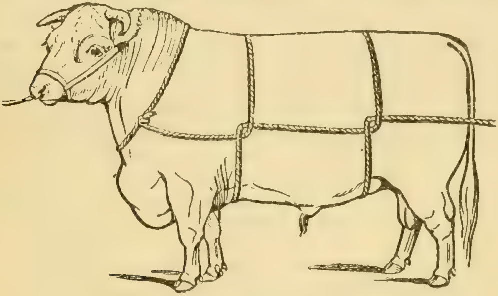

FIG. 12.—ANIMAL ROPED FOR THROWING.

(*From Clem Stevenson's article on Aberdeen-Angus Cattle in the Kansas State Board of Agriculture*, 13*th Report*, *Part III.*, *p.* 357, 1901-2, *pub.* 1903.)

One man pulls forward by the halter shank, while two or three men pull at the loose end of the ordinary cart rope which has been fitted on as shown in the figure. The animal generally goes down without a struggle.

fail to bring about a condition of sterility, it is incapable of exercising an influence over the general metabolism like that induced by ovariotomy.

Calf Diseases.

White scour (associated with *Tympanitis* or "hoven" from indigestion) often breaks out even in sucking calves, when they begin to eat hay. A young calf's stomach is too small, and it is also in other respects unsuited, for digesting such dry food. Green forage or silage, in place of hay, is better; but when a calf is a few weeks old, hay of fine quality may be used in moderate quantities. In the case of hand-fed calves the milk, on the outbreak of scour, should be given oftener than twice a day. The undigested curd produces a light colour of fæces, the acid in the stomach having expelled the whey and made the curd hard and cheesy. *Remedies*—In young calves, diet by feeding often and reducing the quantity of food supplied at each meal, giving boiled starch and less cream if the milk be rich. Administer a stimulant and purgative, such as a mixture of powdered rhubarb and magnesia, 4 drams, along with 15 to 30 grains of ammonium carbonate two or three times daily in flour gruel, or 2 drams of chlorodyne and 1 dram of bicarbonate of soda in gruel. Two to 4 oz. of castor-oil may at times be substituted for the rhubarb and magnesia; and, when calves are older, 4 to 6 oz. of Epsom salts, and ¼ oz. of gentian and ginger powder may be given.

Concrete, being easily cleaned, makes the best floor for all cattle-houses. There should be sufficient fall into open channels in preference to covered drains, to prevent urine stagnating in pools. The channels should be regularly swilled with water to prevent the occurrence of sour or putrid odours, which are specially objectionable in a calf-house. The concrete floors of cow-houses and calf-houses require thorough disinfection before calving, and once each week after, with a solution of 2 lb. bluestone (sulphate of copper) to every 3 gallons of water.

A **deadly diarrhœa** may also be induced if the cows are too highly fed, or if the food is impure or inferior to such a degree that the system becomes fevered, so that an abnormally large proportion of albumen is present in the milk. Excess of albumen, inducing convulsions, often occurs in calves fed on undiluted Jersey cows' milk. The albumen precipitates in the calf's stomach, and is made hard and indigestible by the acidity which develops. The irritation throughout the alimentary canal, no doubt intensified by some alkaloid poisoning, induces death within a few hours. *Treatment* must be directed towards the restoration of the normal condition of the cow, and while this is progressing, to treating the milk so that the excess of albuminoids and other deleterious matters is rendered innocuous, as by the addition of 1 dram of citrate of potash. This may also be to some extent accomplished by a local method of "burning the milk" by stirring each pailful with a red-hot bar of iron.

The **contagious form** of white scour is an extremely fatal disorder among calves. It appears, generally, when large numbers are crowded together under insanitary conditions associated with faulty feeding. Once established, it is difficult to eradicate. The immediate isolation of affected cases and stringent disinfection is imperative. Professor Nocard was employed by the Board of Agriculture for Ireland to investigate the disease.[1] He discovered that it was due to the presence of a microbe which got into the calves' blood circulation by the navel, but which might be present in large numbers in milk-fed calves without doing injury. When the bacteria were artificially cultivated outside the body of the animal and healthy calves inoculated, white scour was invariably produced and death occurred. The navels of calves which died of the disease in the natural way were found to be diseased. He believed that the microbes "are present in the genital passage of the cow, on dirty straw or hay, and on the floors of cow-houses and calf-houses, and in fact on everything about a farm where 'white scour' is prevalent." Calves that survive an attack of white scour are very liable to die of a lung disease which is a frequent sequel to it. The *preventive methods* recommended are as follow:—Thoroughly disinfect the cow by a warm 2 per cent. solution of lysol[2]; tie the navel of the calf immediately after birth with twine which has been kept in a solution of lysol; immediately brush over the hanging end of the navel and surrounding parts with a solution containing methylated spirits, 2 pints, and iodine, 35 grains; and, after drying, dress again with a thick layer of collodion containing 1 per cent. of iodine, or with Stockholm tar; remove the calf to a bed of clean carbolised straw.

"**Husk**" or "**hoose**" (denoted by the unthriving appearance of the animal, a husky cough, and a discharge from the nostrils) is liable to occur in autumn, or in late spring, especially if calves are allowed to get down in condition. The disease is similar to gapes in poultry, and is due to the presence in the trachea and bronchial tubes, often in large numbers, of the nematode worm, *Strongylus micrurus*, causing irritation and inflammation (bronchitis). *Treatment* consists of keeping the animal warm, feeding well, and giving turpentine ($\frac{1}{2}$ oz. to 1 oz.) soaked into dry meal, and then mixed with cold gruel, and repeating once, or perhaps twice after an interval of a few days. When given in this way the risk of choking from turpentine is reduced to a minimum. Affected animals should be housed at night and not allowed out until the sun is up. This is also an effective means as autumn approaches of preventing the attack. Leaflet No. 40 (*q.v.*) of the Department of Agriculture for Ireland recommends for each calf twice daily $1\frac{1}{2}$ tablespoonfuls of a mixture made up of 1 dram oil of cloves, 3 oz. spirits of turpentine, and 24 oz. linseed oil; but this involves much labour.

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[1] See the Board's leaflets on "White Scour in Calves," Nos. 11 and 11A.

[2] Carbolic acid, 5 per cent., may be substituted for lysol, and iodoform for iodine.

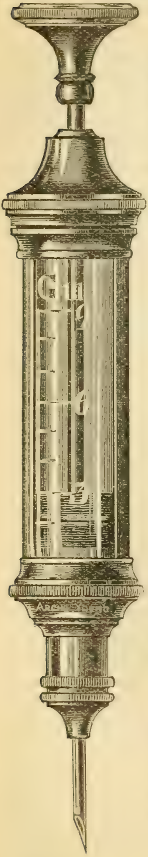

FIG. 13.—PROFESSOR W. O. WILLIAMS'S INTRATRACHEAL INJECTION SYRINGE. (Reduced one-fifth.)

Another effectual remedy is an intratracheal injection consisting of—

Olive Oil . . .	100 parts.
Pure Carbolic Acid . .	4 parts of each.
Oil of Turpentine . .	
Chloroform . . .	

The sharp point of the syringe is thrust through the skin and the wall of the trachea (windpipe) in the middle of the neck, and 1 to 2 drams of the mixture are injected into it. The operation may require to be performed three times, with an interval of three days between two operations.

The object of the treatment is to kill or paralyse the worms, so that they lose their power of adhering to the mucous membrane of the trachea and bronchi, and can be expelled by coughing. If treatment be neglected too long, the worms are liable to form into a ball too large to eject, and the risk of choking the animal becomes imminent.

Coccidiosis.—A unicellular organism (protozoon), *Coccidium oviforme*, parasitic on animals, gives rise to a malady called coccidiosis, which is extremely prevalent among rabbits. *Post-mortem.*—The rabbit is found to be emaciated, and the liver shows many whitish areas (really abscesses) in its substance. This condition was formerly attributed to tuberculosis, and was so described in the agricultural papers. Another form, mostly seen in young rabbits, is the intestinal, in which the mucous membrane of the small intestine harbours the parasite, and in consequence becomes congested and thickened and is accompanied by profuse diarrhœa. This is much the more fatal form of the disease. Scrapings from liver abscesses or from the thickened intestinal mucous membrane examined microscopically show great numbers of the oval-celled parasite.

Preventive measures.—When the disease occurs in a rabbitry all the animals which appear to be healthy should be isolated in clean quarters and infected ones killed off. The coccidium is conveyed from animal to animal by the fæces. The latter should therefore be burnt and the hutches thoroughly washed and disinfected. When rabbits in a warren are affected they should be shot as closely as possible, quicklime spread about, and the warren closed for a year or more.

Coccidiosis has been observed in cattle and sheep in this country by Sir John M'Fadyean and others, and is probably much more common in these animals than at present suspected. Diarrhœa, emaciation, and inappetence are the principal symptoms. *Post-mortem.*—White nodules are found in the liver and on the intestinal mucous membrane. Sulphate of iron has been found useful in checking the diarrhœa and restoring the appetite.

Young cattle are particularly liable to **ringworm** in winter if in poor condition, as imported Irish often are. White scaly patches without hair appear most abundantly about the head and neck, as the result of the growth of a vegetable parasite, *Trichophyton tonsurans*, which may be destroyed by the application once, twice, or three times, according to results, of one or other of the following dressings: Red mercurial blistering ointment made up with a double supply of lard; paraffin oil; carbolic oil; or hot lime made into a thin paste and spread on with a flat-pointed stick. Leaflet No. 45 of the Department of Agriculture for Ireland recommends the application with a stiff brush every second or third day till cured, of a mixture of 1 pint of train or fish oil and half a pound of sulphur, or a mixture of lard and sulphur. Even treacle smeared carefully over the surfaces of the affected parts has proved successful. The last destroys the organism by excluding the air which is necessary for its existence; the other substances directly poison it. After an outbreak of ringworm, the inside walls of the cattle-shed and the woodwork with which the animals come in contact must be whitewashed with fresh lime-wash "to which has been added 1 pint of paraffin per gallon,"[1] otherwise the cattle wintered in the shed the following year will be affected. The organisms producing ringworm also adhere to gates and rubbing-stones in the fields, and are in this way transferred to fresh lots of cattle in succeeding seasons, if preventive means be not taken. When cattle are thriving rapidly on good pasture, the spots disappear to a great extent, but if not treated, spores persist till the following winter and produce a fresh outbreak. Cattle bought in an open market where ringworm is seen should be washed as a precautionary measure with a solution of carbolic sheep-dip.

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[1] Or tarred, or painted. See Appendix Y.

Lice of two common species appear on British cattle—(1) the large, or broad-bodied, or sucking ox-louse, *Hæmatopinus eurysternus*, which lives by piercing the skin and sucking blood; and (2) the small or biting ox-louse, *Trichodectes scalaris*, which has biting jaws in place of a sucking mouth, "and feeds on the decaying portions of the cuticle and hairs," and not on blood. Both are insects with six legs, and both do injury by causing irritation, the sucking one to the greater degree. If cattle of any age are allowed to become too lean, are kept too hot in a close house, or fed for a time on insufficient food, as barley-straw or flying-bent (Molinia), or any other inferior hay, they are liable to become infested with lice (usually both species together), most abundantly about the rump, head, neck, and shoulder tops. Lice may be destroyed by one or two dressings, well rubbed in, of train oil, sour buttermilk, black soap, or any of the various carbolic dressings. Paraffin oil is effectual, but requires care in application. Anything which would injure the cuticle or poison the animal (see p. 282) in the event of its licking the skin, which it should

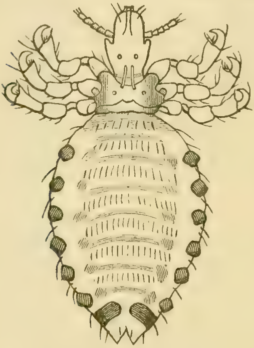

FIG. 14.—LARGE SUCKING OX-LOUSE
Hæmatopinus eurysternus

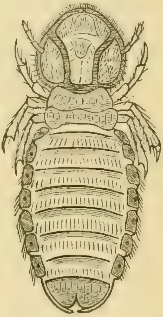

FIG. 15.—SMALL BITING OX-LOUSE
Trichodectes scalaris

(*After Drawings made by the late Professor Allan Harker, R.A.C., Cirencester.*)

do regularly, must be avoided. Tobacco and the seeds of stavesacre are used in decoctions as dressings against lice. They cause poisoning if taken in by the animal licking. "**The symptoms** are those of nausea, attempts to vomit, diarrhœa, and convulsions, and the treatment is to give stimulants." Serious losses have at various times occurred among stock through poisonous dressing, such as blue mercurial ointment, being applied to the skin. All dangerous remedies should be discarded in favour of the safe and simple ones.

Young cattle, while casting their temporary molars, are put off their food when a loose molar gets displaced, so that it lacerates the tongue or the side of the jaw during the act of chewing. With a gag to hold the jaws apart the tooth may often be removed by the fingers, or, if too firm, by forceps.

Warts, or angleberries, on the udders, teats, and bellies of cattle are, if pedunculated, easily strangled by a ligature of catgut or thin twine tied round the neck, or twisted round and simply pulled off by hand ; but when they grow on a broad base the animal has to be cast, the warts removed by the knife, and the parts seared with a hot iron.

In districts where **blackleg** is prevalent, calves over six months old should be protected from infection by the insertion under the skin of the tail of threads soaked in an attenuated virus of "blackleg," and the operation repeated once a year until the animal is three years old.

CHAPTER XIII

GRAZING CATTLE, THEIR DISEASES AND POISONS

Selection of Grazing Cattle—Early Maturity—Barrenness—Hunter's Free-Martin—Bad Points—Three Classes of Grazings—Symptoms of Ailment in Cattle at Pasture—**Bovine Diseases**: Anthrax, Black Quarter, Red-Water, Foot-and-Mouth, Pleuro-Pneumonia, Broncho-Pneumonia, Rinderpest, Johne's Disease, Bacillus of Necrosis, Actinomycosis—**Poisons**: Arsenic, Lead, Hemlock, Belladonna, Ergot, Acorns, Yew, and Laburnum—Snake Bite—Warble Fly.

"Man's most natural occupation is the raising of flocks and herds upon the grass of the plains, the valleys, and hills. Grass and cattle are inseparable in the economy of nature, and the husbandman of to-day is following the first progressive instinct of mankind in utilising through animal husbandry the otherwise wasted herbage."—W. M. Hays, U.S.A.

IT is more difficult to judge of the quality or value of store cattle than of fat ones. The most important rules for guidance in this matter cannot be learned by reading. A man must get to understand animals instinctively through long experience and intimate connection with them, to be able to judge of the possible outcome from the appearance at any time. In buying, one ought to learn how the beasts have been kept for some months previous to the time in question, and never take those from a better climate, or which have been accustomed to better food, than is to be had in their new quarters. Cattle moderately fed, and not kept too warm in winter, are generally acknowledged to have done better when the end of the grazing time comes, than those which have been well fed but kept in close byres; in the latter, the hair tends to fall or rub off too early in the season, leaving them too little of their natural hirsute protection when turned out to grass in spring. Those that lie out all winter often in the end do best, if not too lean at the beginning of the season; the extra constitution gained by being out and living under more natural conditions enables them to make up more than the winter's loss of flesh. To those not fed on cake during winter, a few pounds per day, given for five or six weeks before they go out, affords a good start, and "comes out" afterwards in "extra condition." Cattle at three or four years old arrive more quickly at maturity than two-year-olds, and "kill better" than they look, having more internal fat, and being "better made up," though they lay on a smaller amount of beef in a given time during the period of their existence (see p. 298, and Appendix U). Three-year-old grazing cattle are now difficult to procure unless from poor land and high or cold districts, where it would not pay to force by artificial feeding, and where breeds exist in which maturity is slowly reached.

Early Maturity.—The propriety of making beasts prime at two years, or of allowing them to be three or even four years old before finishing, must be determined entirely by the quality of the natural products of the farm, the climate, and the tendency to the laying on of flesh in the animals suited to those surroundings. It would be absurd, and it would never pay, to try to force a Galloway or West Highlander to maturity at two years, when kept in its native conditions. Time must be allowed for the purpose of overcoming local natural disadvantages. It would be an equally bad practice, with a good climate and the best of food at hand, where animals of a breed accustomed to mature rapidly would do best, to keep them a year longer than necessary. A large proportion of food (and in this instance expensive food) is burnt up to supply the waste of the system; so that keeping animals till three years old, when by proper management they could have been fat at two, increases the loss by at least one-third of food substance. (See Chapter XIV.)

Barrenness or uncertainty may be induced by the following causes:—1st. Overfeeding in the case of either sex, thus loading the reproductive organs with fat. The remedy in the case of over-fat animals is judicious starving, and plenty of exercise or work in the case of cattle and horses. Some foods induce uncertainty in breeding more readily than others. Sugar, molasses, and linseed are amongst the worst; but these are, nevertheless, often used to prepare beasts for show or sale, because they produce a smooth and glossy coat of hair, as well as lay on fat. These foods would not do damage if given in moderation with hay or straw; it is when supplied in addition to a full feed of other concentrated food that they do injury. Foods for breeding animals should be particularly rich in phosphates, and have more albuminoids to fat-formers than in the case of fattening animals; such food ingredients are beans, peas, lentils, and gram. Very fat animals do not come often in season, and cattle settle better and feed faster as they become what the butchers designate "fat-ripe."

2nd. See Appendix S.

3rd. Too low condition, especially if associated with exposure to cold and wet, as in the case of cattle wintered in the open air on poor food, or of heavy milking cows "sucked down" by a large calf or perhaps by two calves.

4th. Constitutional weakness from in-and-in breeding.

5th. Being a free-martin or dumb-martin, that is, a heifer which in consequence of its being a co-twin to a normal bull possesses an abnormal reproductive system and is therefore sterile.

John Hunter in *Observations on the Animal Economy* records that "in form it (the free-martin) very much resembles the ox or spayed heifer, being considerably larger than either the bull or the cow, having the horns very similar to the horns of an ox (see Plate II. A). The bellow of the free-martin is similar to that of an ox, having more resemblance to that of a cow than that of a bull" and shows that "the incapacity to breed, and all the other peculiarities, result from its having the generative organs of both sexes combined in a more or less imperfect state of development; in some the organs of the male predominate, in others those of the female."

Lillie and others have shown conclusively that the essential conditions for the production of a free-martin are (1) the presence simultaneously in the uterus of the mother of a male and of a female embryo; (2) the fusion of the fœtal membranes of these embryos with a consequent development of a vascular intercommunication between them.

It is established that the development of the distinctive male or female pattern of reproductive system is directed by the internal secretion of the testes and of the ovaries respectively. The internal secretion of the testis—the so-called male sex-hormone—is produced at a slightly earlier stage of development than is the internal secretion of the ovary—the female sex-hormone.

In the case of twins, one a male and the other a female, which are connected by a common blood-supply, the sex-hormone of the male twin will be circulating in the bodies of both before the internal secretion of the ovaries of the female twin has appeared. The organs of generation of both will develop therefore according to the male arrangement. The male twin will pursue its normal development; the female will become transformed according to the intensity and duration of the action of the sex-hormone of the male into an individual more or less resembling a male.

Should the transformation be complete, and theoretically this is not impossible, then twin bulls would be born, one of which would be a perfectly normal male, the other actually a "masculinised female," which functioning as a male must beget only female offspring.

Usually, however, the transformation is not so complete, and a free-martin is produced which is to be recognised by the imperfection of its external organs of generation and by its abnormal general conformation. In other cases, a heifer co-twin to a normal bull is normal in external appearance but has no bulling-periods.

It is to be noted, however, than on an average one in every eight cases of twins, one a male, the other a female, results in the birth of a perfectly normal bull and an equally perfect heifer. This is due to the fact that in such cases fusion of the fœtal membranes has not occurred.

A heifer which is normal in appearance and in behaviour is not to be regarded as a free-martin, nor the free-martin itself as a monstrous calf, since its abnormal development is moulded by circumstances over which it has no control[1] (see Appendix I).

The points of a good feeding animal are very much those already described at p. 57, in treating of the characteristics of all flesh-producers. M'Combie says, the following denote slow feeders: "Deep neck; thick ('trousery') legs and tail; thick skin, with hard hair and hollow eyes."

Grazings in this country may be divided into three qualities:—(1) **First-rate pasture**, which before the war was rented at three guineas, four guineas, or in some instances (which are admitted not to be numerous) even five guineas per acre. The extent of this land is not great, and much of it is annually let by auction. It is found in Leicester, Nottingham, Somerset (the marshes), in the Lincoln and Cambridgeshire Fen land, over parts of the Old Red Sandstone of Herefordshire, and in many small areas along the banks of rivers. These pastures are capable of feeding large bullocks without cake, and often an area less than an acre per bullock is sufficient. Sometimes an extra sheep per acre is put on. Sheep eat numerous weedy plants in pasture which cattle reject unless when starving, as in prolonged drought—for example, ragwort, *Senecio jacobæa*; knapweed, *Centaurea nigra*; and oxeye daisy, *Chrysanthemum leucanthemum*. **Ragwort poisoning** is not so often experienced in this country as in New Zealand, where it was first diagnosed. Cattle do not thrive nearly so well on pasture of superior quality if sheep are kept on it during winter, as these eat out some of the finer grasses. The grass season in England is from about 1st May till the beginning of November. At first, if the growth of grass is backward, a little hay may be given with advantage. Thistles, nettles,[1] and all large weeds which are not eaten under normal conditions, should be cut regularly before seeding, and tufts of coarse grass also mown. Dung can be either spread on very good pasture or, better, carried off to prevent the growth of dark green "tathy" patches. It is considered a sign of good land to have a perfectly even surface, and a very close cover, which should not be allowed to become too long. Very fine pasture has often a velvety feeling under foot. Two lots of cattle can be made prime fat on the same land in one season—the first going off by the first and second weeks of July, having gained, without receiving cake, 8 or 9 stones of beef. The land is allowed to clean by resting for ten days.

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[1] **References**—Lillie, F. R., "The Free-Martin: A Study of the Action of Sex-Hormones in the Fœtal Life of Cattle," *Journ. Exper. Zool.*, vol. 23, No. 2, July 1917. Continued in footnote to Appendix I.

The second lot of cattle, not being so far forward or so good in spring as the first, would, while the best cattle occupied the best pasture, be kept on pasture slightly inferior to it. These require a few pounds of cake, as the grass begins to fall off in quality at the end of September and in October. Some graziers think it pays to give cake to cattle even on the best pasture throughout the whole season, but this must entirely depend upon the rent of the pasture and the relative prices of cake and beef.

A few rough beasts (perhaps one for every 4 or 5 acres) kept to clear off rough grass, should run out all winter, and will do remarkably well if sheltered from cold winds, and if 2 or 3 lb. per day of undecorticated cotton-cake be given, with a little fodder in time of snow.

The shelter necessary is either natural—as trees and depressions in the ground; or artificial—as stone walls, hedges and shelter-sheds. In Leicestershire, straw used sometimes to be thrown under the hedges to make a comfortable bed for cattle in summer.

(2) **Second quality pasture** is suited for feeding the lighter breeds of smaller animals. If these are being finished they should have cake, or cake and meal all the time (beginning with 3 or 4 lb. and ending with 6 or 7 lb.), given in troughs moved regularly from time to time to different parts of the field, to distribute the manure equally. By giving cake, beef is produced faster and of better quality; the land is also gradually improved by the increased amount and value of the droppings, and will consequently "carry" more stock. It should not be forgotten that this is a more expensive way to manure land than by the application of phosphate of lime to encourage the development of clover and the fixation of free nitrogen.

(3) **Third quality pasture** is useful only for keeping store

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[1] The Author saw nettles eaten by Hereford cows at Foxley in the drought of 1919, and thistles are picked up by cattle a few hours after being cut when wilted and before becoming hard and prickly.

cattle or sheep, or, in some localities, dairy cows. The land is often good, but the climate unsuited for fattening beasts. Besides hill and mountain lands, the various downs belong to this class.

Symptoms unnatural to healthy cattle at grass which may be seen without handling them:—(1) An animal away by itself, if accustomed to go with others, and perhaps cowering behind a wall with its back up; (2) not stretching itself on being quietly raised; (3) with hair standing on end, "staring"; (4) showing the absence of lick-marks on the hair; (5) with saliva flowing from the mouth; (6) not feeding or chewing the cud for a considerable time; (7) thin in condition of body; (8) blown out at the sides by gas formed through stoppage of digestion; (9) showing a peculiarity in the movement of the head or limbs; (10) quick breathing, or a cough; and (11) hollow sides consequent upon want of food.

The hollow condition of a heifer "a-bulling," caused by want of settling to feed, must not be mistaken for disease. She then stands quietly while another of the herd jumps upon her from behind, and she in turn tries to jump upon others, which, however, move away.

In addition to visible signs the extremities, including the horns, may be cold, and the skin tightly held to the flesh over the ribs, and cold to the touch; the temperature may also rise from the normal (100° or 102° F.) to 104° or 106° in the more ordinary forms of disease, such as pneumonia and garget, and even 110° may be registered in a case of rinderpest.

The commoner or more important bovine diseases which reduce grazing profits are the following:—

Anthrax is a widely distributed infectious febrile disease due to the presence of the *Bacillus anthracis* in the blood. Cases usually occur singly, the disease not being directly communicable by one animal to another, nor by an anthrax carcase. Animals have been shut in a small enclosure beside such carcases and kept there till the carcases broke up and the animals gnawed the affected bones and yet have not contracted the disease. The spores, which develop when affected blood is exposed to the air at summer temperatures, become extremely resistant to change of temperature, and even to germicides, and may lie dormant for years until a natural habitat is found in the blood circulation of an animal, and the spore develops into the bacillus which produces the disease. Blood should on no account be permitted to escape, or the ground inoculated will be a source of sporadic infection for years. The carcase should be disposed of according to the Board of Agriculture regulations without the skin being broken—either burnt, or buried 6 feet deep in flour of lime in a dry, sandy, or gravelly subsoil—and the surface of the probably infected part of the field heavily dressed with hot lime.

The course of the disease is generally extremely rapid—taking only a few hours from the first appearance of illness. Still undoubted cases of recovery have been recorded. The animal becomes greatly depressed and separates from the others—the temperature rises to 107° F., diarrhœa develops, rigors and weakness of the hind-quarters occur, there is great difficulty in breathing, and blood passes through the anus and at times in the urine. Decomposition after death is rapid. Poisoning from consuming meadow saffron, *Colchicum autumnale*, and reputed bracken poisoning are the only disorders similar in symptoms to anthrax. The most effective preventive against anthrax is inoculating according to the method introduced by Pasteur. Unsterilised bones from an Overseas source (as from India) are liable to contain the germs of anthrax, and should never be applied to pasture or to cultivated land on which live stock is kept. There is reason to believe that much of the increase of anthrax in this country is due to the want of a Government Order to prohibit the use of raw bones from contaminated sources.

Black quarter, quarter ill, or **joint murrain**, is a deadly infectious disease, due to a bacillus, and has a morphological resemblance to a malignant œdema. Young cattle and sheep are liable to the malady. Infection usually takes place by inoculation through a wound on the skin, or perhaps of the mucous membranes. Intense inflammatory swelling, bloody œdema, and emphysema of the tissues result, and a general condition of poisoning from the poisons (toxins) produced at the local lesion.

The symptoms are loss of appetite, lameness, a hot swelling (usually in a hind-quarter) which is at first painful, but rapidly increasing becomes painless, cold, and crepitating on being touched, owing to the presence of gas in the tissues.

Treatment is usually of little avail, but, if discovered in the early stage, the swelling should be cut into and washed with a strong antiseptic, as 5 per cent. solution of carbolic acid in water. Old-fashioned graziers still introduce, with what is widely reported to be satisfactory results, a seton, which is kept open by a piece of twine drawn through it, in the dewlap of their calves at six months old. The belief is that the open wound secretes an antidote, which is absorbed into the system of the young susceptible animal and acts as a preventive of the disease. But inoculation with a Pasteur Co.'s vaccine prepared for this specific disease is more scientific and is now fairly reliable, a small percentage only dying of the effects of the inoculation.

Of the **muir ill**, or blood-murrain, red-water, black-water (which has not been generally associated with the red-water of tick-infested countries), the late Principal Wm. Williams said:—

> "I am induced to conclude that the disease originates in an impoverished condition of the blood arising from want of proper food, that the albumen of the blood is thus degraded in quality, and as such is unfit to be appropriated for the nourishment of the tissues, and is consequently excreted by the kidneys and expelled from the body."

It is more common in females than in males, and more common in heifers than in cows; and it very frequently attacks cattle turned into coppice woods or on to moorland, coarse and marshy pastures, where the food is of inferior quality.

Symptoms.—The temperature rises; the urine, which is increased in quantity, is red in colour; constipation sets in, and is sometimes followed by diarrhœa. The animals have a poor and unthrifty appearance; they totter as they walk, and appear weak in the loins; the membranes are unnaturally pale, and anæmia is marked.

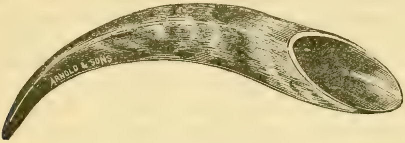

FIG. 16.—DRENCHING HORN.

Besides the acute form, which runs its course in a few days and is seldom fatal, there is also a chronic and usually fatal form, with similar symptoms; but there is no fever, and the red coloration of urine is often intermittent.

Treatment.—Administer a purgative, preferably Glauber's salts (*sodium sulphate*)—at one time much more used than Epsom salts in cattle practice—and give good, nourishing, easily digested food, such as eggs, followed by linseed cake or cotton cake when the animals are convalescent; and, as a tonic, two teaspoonfuls each of sulphate of iron and powdered gentian.

Preventive means are, keeping cattle out of woodlands that are liable to produce red-water, draining poor wet land, and improving the quality of the pasture by the use of 10 cwts. per acre of slag phosphate on damp places, or 6 to 8 cwts. of steamed bone flour on dry land.

Leaflet No. 63 of the Department of Agriculture and Technical Instruction for Ireland connects one form of the disease with the bite of the common tick, which introduces a parasitic organism into the blood that destroys the red corpuscles. It is the discharge of the remains of the corpuscles thrown off by the kidneys which gives the characteristic colour to the urine of affected animals. The colour is usually dark, "varying from light red to chocolate, or even approaching black." Healthy ticks are thought to be able to carry the disease from an affected animal to a sound one. The great means of prevention is to remove the natural shelter for the tick, such as clumps of bushes and rough herbage. Taking a crop of hay and closely grazing the aftermath, or the cropping of arable land, is found to be a useful means of prevention. Top dressing with 3 tons of lime and 10 cwts. of crushed rock salt per acre has also been found useful. In treatment the great object is to stop the rapid wasting, and to build up strength by careful nursing, and by giving "well-boiled oatmeal gruel, boiled flax-seed, and even milk, eggs, ale, and stout."

Foot-and-Mouth Disease, *epizootic vesicular stomatitis*, or "vesicular murrain," is a most acute and contagious specific fever, affecting not only cattle and sheep, but pigs, and it has been said horses, and even man. In *The Lancet*, 26th September 1896, Professor John Glaister, of Glasgow University, records the symptoms of this loathsome disease in the human subject. A high temperature lasts for fourteen days, up to 102·6 at times, and only disappears entirely about the twenty-first day. There is a greatly inflamed and tumid condition of the mucous membrane of the nose, and of the mouth and tongue. A pinkish rash, not coinciding with those of common diseases, appears on the forearms, and is followed by a similar rash on the palms and soles; the papules become vesicles, and desquamation of the skin follows four or five weeks after. Fatal results occur, but, owing to the general practitioner classifying the malady under other miscellaneous names, no estimate can be formed of the number of cases. In convalescence four weeks have to be spent in bed and altogether 6 weeks off work. "The *Materies morbi* may be transmitted to man either from the products of the cow-milk, butter, or cheese—or from its absorption into the body by some accidental raw surface from the discharges—buccal and nasal—of the animal" and "the burden of the disease falls chiefly upon the membrane of the gastro-intestinal track." It is not believed that human beings contract it from each other.

Symptoms in Cattle.—Smacking of the lips is followed by a flow of saliva. After three or four days the mucous membranes of the lips become red, and small vesicles form, which coalesce to produce larger blisters. The nostrils rarely, and the dorsum of the tongue frequently, become slightly affected. The animal walks tenderly or limps, and may kick, making a rattling noise with the hoofs. The skin round the coronet and in the cleft between the digits becomes hot, red, and painful, and there too vesicles form. The teats and the udder at the base of the teats are sometimes the seat of vesicles. The temperature rises high —up to 105° F. Mortality is not usually great, unless when animals die from want of food or are killed by rough treatment, as was frequently the case in the Argentine Republic during the outbreak of 1900. Sometimes an attack is so mild that, under favourable circumstances for the animal's comfort, its presence is hardly noticeable. The most serious losses occur in flocks during the lambing season, and among cows nursing calves, especially when vesicles develop on the teats and produce gastro-enteritis; and in the case of milch cows which go off their milk. *Treatment.*—Affected animals should be left severely alone, supplied with abundance of soft food and water, and not allowed to trample in mud, manure, or sand, which poison or irritate the lesions about their feet. If they are tame and accustomed to being handled without becoming excited, the sores may be treated with an electuary of treacle, 1 oz., and borax and potassium chlorate, 1 dram each.

The Government policy for many years has been to slaughter affected and in-contact cattle with the exception of valuable pedigree animals, as well as to draw a cordon round an extensive adjoining area to prevent the spread of the disease by restricting the movement of cattle and sheep and pigs. Numerous sporadic outbreaks occurred in England in 1921; which have baffled the most searching investigations into probable causes, by the experts of the Board of Agriculture and Fisheries, now the Ministry of Agriculture; and developed into the epizootic outbreak of 1921-22. Imported food and litter were thought at first to have no connection with the outbreaks; whether or not birds, such as wild ducks which travel far to feed, and often at night when they cannot be observed, are in any way responsible—is a question which has not yet been determined.

Inquiry into the nature and treatment of the disease having been impossible in this country since stamping out was introduced in 1900, investigation should be continued and extended in India until all necessary information for our purposes has been secured, and a guarantee established against possible national loss of a gigantic order. The Veterinary Department of the Ministry of Agriculture in 1920-21, endeavouring to find a specific organic cause, sent a laboratory ship with all necessary equipment to sea for safety, but their efforts were without result.

The dangers and possibilities generally, succinctly stated by **Wm. R. Davis,** indicate the parlous position of the live stock industry under existing regulations and partial knowledge of the subject:—

"It is known that the disease is due to an ultra-microscopic organism that can pass a porcelain filter, and that passive immunity can be induced by inoculation of serum from a 'salted' and 'fortified' animal. Foot-and-mouth spreads like wildfire if it is sought to be controlled by isolation and a proclaimed area, as I can testify from my own experience. As to the treatment of the malady, the less the patients are doctored the better they do. There is, of course, a malignant form in which many fatalities occur," as for example in the Argentine in 1919.

In recent years when isolated outbreaks occur more frequently in territories which have been free from infection for a time, and in which careful observations have been made, the possibility enters more and more into the foreground that animals which pass through the disease may harbour the virus in their bodies for a prolonged term and expel it periodically or continually (so-called virus carriers). Virus carriers have been recognised beyond a doubt for other diseases (typhoid fever, Asiatic cholera, hog erysipelas). Therefore in ascertaining the cause of new outbreaks this contingency should be given due consideration. If the disease appears in regions which were previously free from the infection, immediate slaughter of the affected herds is indicated as the most effective and also the most practical measure. With the immediate slaughter of the infected herds, the eradication of several local outbreaks was successfully accomplished in recent times in England, and the spread of the infection in the United States in 1902-3 was also prevented, when in a period of seven months in 244 herds, 4712 cattle, 360 hogs, and 229 sheep and goats were slaughtered, representing a value of $128,908. In a similar way Australia has remained free from the infection after the slaughter in Victoria of two herds in 1865. In recent times Holland and Germany also adopted the slaughter of the infected herds in sporadic outbreaks.

Pleuro-pneumonia is a highly infectious disease of the lungs of cattle, and, on post-mortem examination, is characterised by more or less pleurisy, accompanied by pneumonia, causing consolidation of the lung substance, which in section presents a marbled appearance. On the examination of a microscopic section, the lymph-vessels and air-tubes are seen to be completely filled with an inflammatory coagulated exudation. The country was freed from the disease by the energetic action of the Board of Agriculture and Fisheries in 1898, and its re-admission is one of the dangers to the cattle industry that the Ministry of Agriculture has constantly before it.

Broncho-pneumonia[1] is a disease which was brought into prominence in this country, owing to its frequent recurrence among live cattle imported from Canada and the United States of America, and on account of its having been repeatedly mistaken for pleuro-pneumonia. The difference in the post-mortem appearances and in the actual seats of the two diseases makes it extremely unlikely for anyone versed in morbid anatomy to mistake the one for the other. In *pleuro-pneumonia contagiosa* the true seat of the disease is not in the bronchial tubes, although the smaller of these become gorged, as already stated.

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[1] For complete details of appearances, etc., see Williams's *Principles and Practice of Veterinary Medicine* (Menzies & Co., Edinburgh).

Broncho-pneumonia is not a "specific" disease like pleuro-pneumonia contagiosa, but one which originates spontaneously when animals are exposed to cold and wet, especially after being heated, as cattle are during transit by rail and sea. It may fitly be compared with influenza in the human species, not of the epidemic type, but of the familiar form of a severe cold. It is termed "cornstalk disease"[1] in America, because it appears in autumn when the cornstalks are past their best and beginning to decay. The true seat of the disease in broncho-pneumonia is the air passages, large and small. Although the lung-parenchyma through which the multitudinous ramifications of the air-tubes pass, naturally becomes congested, it is not subject to such changes as are found in a case of pleuro-pneumonia contagiosa. It is very different with the bronchial tubes, more especially the smaller of them. The desquamation or, in common language, peeling off of the columnar cells forming the epithelial lining of the air-passages indicates the seat of the disease. As the alteration of structure does not extend to the blood-vessels, nature may in time repair the injury, if death be not induced at the acute stage of the disorder.

Not only is the fibrinous exudation of pleuro-pneumonia absent in the air-passages, but pus and degraded epithelial debris take its place, and are expelled from the lungs by the act of coughing in a manner corresponding to expectoration in a human being. The differences described are readily determined by the aid of the microscope, but there is a plainly visible characteristic difference in the post-mortem appearances in the two diseases, which in ordinary circumstances is sufficient to guide the observant practitioner.

A "Provisional Order in Council" was passed with the aid of Herbert C. Gardner (Lord Burghclere), in 1892, restricting the introduction of store cattle from Canada, which had been coming in increasing numbers since 1874. Walter Long, a succeeding President of the Board of Agriculture, carried through Parliament the "Diseases of Animals Act" of 1896, which prohibits the importation of live cattle from abroad, except for immediate slaughter. It is well known that the measure was passed mainly as a result of a mistaken diagnosis of cornstalk disease for pleuro-pneumonia, yet its importance to the great majority of people interested is so great that the House of Commons was fully justified in talking out a bill for its repeal introduced in 1906.

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[1] See a treatise by Dr Frank S. Billings on "Cornstalk Disease," in which the cause is attributed to a common micro-organism found on the leaves of maize.

The loss to the country was so enormous from the outbreak of **rinderpest** in 1864, and from the more recent outbreaks of **foot-and-mouth** disease (notably that of 1883 and 1921-22) —which with **pleuro-pneumonia** form the three important scheduled diseases—that to run any avoidable risk of reimporting these diseases is far too dangerous to be lightly incurred. Although Canadian cattle may be free from all of the three chief dangers, there is imminent risk of disease being carried from the United States over an open unprotected boundary line of about 3000 miles long. Since the "Finlay" *Royal Commission* appointed to consider this highly controversial subject sat in 1921 and brought in a hesitating and unconvincing report[1] (quite contrary to the unrebutted evidence submitted by experts), in favour of lifting the embargo, the danger of disease reaching us has vastly increased. The position is fully detailed in "Evidence submitted" to the Royal Commission by the present writer, 31st May 1921.[2] The Government wisely decided not to act on the report. Rinderpest from India has within recent years firmly established itself in Brazil, and by the importation from Colombia into Mexico of cattle of Spanish origin as foundation breeding stock, a direct road has been opened between North and South America for the introduction of the disease. If our ports were opened it would be but a matter of a few years till it reached our herds, which form the fountain-head of good stock for the whole of the temperate regions of the world. To the greater dangers should be added risk from tuberculosis, contagious abortion and sarcoptic mange.

There are other important, although subordinate, reasons why the restriction on the trade in foreign store cattle should be maintained. The demands of the consumer of foreign meat are best supplied—on the scores of quality, humanity to the animals, and convenience—by the dead-meat trade, to which there is no limit. If the existing embargo were removed, this country would be flooded to overflowing with bullocks produced by nondescript milking cows, and with rough, big-boned, half-wild cattle from the Western Prairies, which would cost the grazier a small price per live cwt., but could not be ready for the butcher till at least a year older than the butchers' cattle bred at home. The home rearing of good cattle for feeding purposes would be checked, and much land, especially the higher districts, in the North of Scotland, Wales, England and Ireland, unfit for fattening but well adapted for the breeding and grazing of young stock, would become derelict. A small body of graziers would probably reap a temporary advantage, as they did prior to 1892, but to their ultimate undoing, and at the expense of the much larger numbers of breeders on the one hand and of consumers on the other. The result of the introduction of Scotch-fed Canadian beef into the London market was to lower the general price of the best Scotch beef, and drive butchers, who could no longer rely on the uniform quality of beef from the North, to supply their West-End customers, but not at any reduction of price, from the best American chilled hind-quarters that could be depended upon.

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[1] See the *Report of the Royal Commission on Store Cattle*, 30th August 1921 (C.M.D. 1139), 2nd and Evidence (C.M.D. 1541).

[2] A brochure of 40 pages (Oliver & Boyd, Tweeddale Court, Edinburgh), issued free to Members of Parliament and others interested.

With the reduction of the commercial cattle-breeding industry of the country, and the development of the dependence of graziers and other feeders upon a foreign supply of cattle which natural circumstances would restrict to the United States and Canada, conditions entirely suitable for the operations of the all-powerful butchers' rings that control the meat markets of the United States would be established, to the injury of the consumer and the ruin of the home producer.[1]

And besides, the injury to **pedigree stock** breeding —one of the most treasured industries of the country—would be incalculable. At the present time this country possesses the most comprehensive variety of herds, studs, and flocks in the whole world, which it supplies with annual casts of breeding animals at high prices. The more demand there is from abroad, the greater is the encouragement to breeders to produce better stock in greater numbers. There is little wisdom, commercial knowledge, or breeding experience behind the arguments that our flocks, herds, and studs are being depleted by the sale of picked animals to foreign customers. Our animals of superior quality are too numerous for any probable foreign demand to have an appreciable influence upon our stock as a whole. And as it will always be necessary for the foreigner to come back to the fountain-head of British breeds to replenish his stocks, which in new surroundings have an inherent tendency to diverge from the original types, the greater the success of the foreign breeder the better will it be for the home producers of high-class pedigree animals. To maintain and develop the trade, foreign purchasers must be guaranteed against risk from contagious disease, and this can be accomplished only by keeping it out of the country.

Rinderpest or **cattle plague** in its home on the steppes of Russia, in Tartary and Japan, is a chronic enzootic malady, and only a more or less moderate proportion of the animals attacked die; but among Western cattle it is the most virulent and deadly of all bovine diseases. It spreads rapidly, and less than 10 per cent. of those affected recover. The latter acquire immunity against future attacks, but some remain "carriers" of the disease, and communicate it later to other cattle. A very few animals are completely immune. It is due to a specific organism in the blood, and is highly infectious and contagious. One of the great problems of the future of cattle breeding in India will be to find and propagate immune animals.

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[1] Nevertheless, on 24th July 1922 the House of Commons, by 247 to 171, voted to introduce Canadian stores.

The symptoms are those of acute fever, with discharges from the mucous membrane of the mouth, nostrils, eyes, etc., as a forerunner to ulceration; and these are followed in turn by constipation, diarrhœa, emaciation, and exhaustion. The disease runs its course in about seven days. A military cordon along the Russo-German frontier to prevent eastern cattle coming west, and vigorous port inspection, were the pre-war safeguards of Continental Europe against the dire consequences of its introduction. An outbreak of rinderpest is one of the imminent dangers of delay in restoring normal peace conditions. Mindful of the disaster and ruin to many stockowners in Great Britain and Ireland during the outbreaks of 1865 and 1877, the British Government wisely prohibit the importation of live cattle from all sources, except for immediate slaughter, a regulation which ought never to be relaxed. Treatment is useless, and slaughter of all infected animals is a necessity. Rinderpest was prevalent all over South Africa in 1896-97, and a serious outbreak occurred after the close of the Boer War. It found its way slowly through Central Africa from Abyssinia, and destroyed most of the buffaloes and many of the wild ruminants in its course to the south. When it reached the trek oxen used in transport work, it was carried by them and left by the way, and it spread rapidly; but a good many cattle (probably 75 per cent.) were saved towards the end of the outbreak by treatment under Professor Koch's method—injection of serum from the blood of an animal which had recovered from the malady, and which had been fortified by receiving several subcutaneous injections of virulent blood.

Johne's disease is due to a **bacillus** very similar to the bacillus of tuberculosis, and is characterised by an inflammatory thickening of the mucous membrane of the intestines.

The malady is chiefly seen in young cows but may be met with in all other ages. The principal symptom is profuse watery diarrhœa accompanied by rapid emaciation and anæmia.

The appetite is maintained for a very long time. An afflicted animal may last for a year or more, contaminating the pastures and endangering the other cows. The bacillus is very persistent, and is not destroyed by sunlight as the tubercle bacillus is. On making a post-mortem the carcase is found to be emaciated and anæmic. The principal change is in the small intestines, the mucous membrane of which is swollen, thickened, and corrugated, and is quite characteristic.

Treatment is of little avail in pronounced cases. However, an attempt may be made to stop the diarrhœa by administering sulphate of iron, 2 drams, and dilute sulphuric acid, half an ounce, in a pint of water once a day. Opiates may also be tried in the form of chlorodyne in 1-oz. doses.

The contaminated pastures can only be restored by removing cattle for a year at least, and top-dressing with salt.

The Bacillus of Necrosis.—This is a thin, rod-shaped organism which in the tissues and in cultures grows into long threads. It is found everywhere and multiplies readily in the soil.

All the domesticated animals are subject to its attack. In the horse the bacillus is found in fistulous withers and poll evil, quitter, sloughing of the skin of the coronet from treads, in severe cracked heels, and in some cases of navel ill in foals. Although the bacillus of necrosis usually remains located in the lesion, at times a septic pneumonia develops by metastasis; this is particularly seen in severe suppurating processes in the foot.

In cattle, **bacillary necrosis** of the liver is common, and shows itself by multiple, slightly prominent, dry nodules which later may undergo softening. The microbe is thought to be carried to the liver from suppurating processes elsewhere, in udder, foot, etc. As a rule no symptoms are manifested and the lesions are a post-mortem finding.

Foul in the foot is said to be due to the bacillus of necrosis, but here the pus-forming organisms (*staphylococcus* and *streptococcus*) are probably associated with it.

Diphtheria of calves, an acute infectious disease of sucking calves—in the course of which false membranes are found on the mucous membrane of the mouth and pharynx, followed often by septicæmia and death—is certainly due to the bacillus of necrosis.

Treatment.—After removing the false membranes, the parts should be swabbed with a solution of permanganate of potash (5 per cent.), and chlorate of potash (half a dram); given as a drench in a little water.

Actinomycosis.—This is a chronic disease mainly affecting cattle and caused by a vegetable parasite, the *Actinomyces*, or Ray-fungus. The disease is popularly known as "wooden tongue" and "lumpy jaw." The parasite is thought to gain an entrance to the tissues through sharp particles in the food—especially awns of barley. The malady is much more frequent in stabled cattle than in those kept at grass. In the tongue the actinomyces multiplies and gives rise to extensive tissue production and to ulceration. The organ is greatly increased in size, becomes as hard as a board, and projects from the mouth in advanced cases; saliva dribbles from the mouth, and mastication and rumination are performed very slowly. The patient loses condition. When the organism attacks the jaw the bones involved swell, soften, become porous, and finally suppurate and ulcerate through the skin. The pharynx is a common seat of the malady and in this site it gives rise to "snoring." Actinomycosis of the skin shows itself by rounded tumours with purulent contents, found principally about the throat and known as "wens." This form is particularly common in cattle of all ages in the eastern counties of England.

The udder is occasionally attacked, and thin hard nodules or an extensive thickening of the organ develops. Actinomycosis is rare in other animals (and man).

In the horse it is seen as a large hard tumour on the end of the severed testicular cord after castration (scirrhus cord), and occasionally in the udder of the mare. The udder of the sow is not very rarely the seat of the malady.

Treatment.—For "wooden tongue," the internal administration of potassium iodide in doses of 2 or 3 drams daily in water is usually efficacious. Swabbing with tincture of iodine helps. The potassium iodide treatment can also be tried for other localisations of the malady. Wens should be opened, their contents evacuated, and the cavities filled with tow soaked in tincture of iodine.

Poisons are "substances which when absorbed into the blood are capable of seriously affecting health or destroying life" (Taylor). In the case of the lower animals, irritants which do not come within the scope of that definition should also be added. Stock may be poisoned by accident or mistake, on rare occasions by evil intent, by excessive doses of medicine, by grazing on poisoned herbage, or having access to poisons in bulk, by careless dipping, by cutaneous absorption, or by licking after skin dressing. Arsenic is a good example of a common mineral poison, belladonna of a vegetable poison, and cantharides of a poison of animal origin. The action, as in the case of mustard, may be merely that of an irritant on the alimentary canal, but it may, on the other hand, by its action on the nervous system, produce, like belladonna, an effect akin to coma.

The treatment must be prompt and energetic, the cause sought for, pastures examined for injurious plants, the possibility considered of contamination by mineral poisons of water and pastures, or of impurity of cakes and other feeding stuffs. "The curative treatment comprises certain general principles. First eliminate the poison from the system as soon as possible, and, if it has been only recently administered, the stomach pump is effective; if this be not at hand, or if the poison has been in the system some time, demulcent drinks, as wheat-flour gruel and white of egg should be given, as well as an oleaginous purgative followed by stimulants. If the poison be known, there may be an antidote which should be administered. But antidotes are not known for all poisons. They are used in cases of poisons of a physiological origin, and they have a diametrically opposite action to that of the poison, or they may have in other cases a chemical action, turning a soluble salt into an insoluble salt. Poisoning by absorption from the body surface is treated by washing the agent off."

Mineral Poisons.—**Arsenic,** derived from sheep-dip, is one of the commonest. "The best antidote is hydrated sesquioxide of iron, which can be prepared in an emergency by adding ammonia to perchloride of iron, washing the precipitate, and administering every ten to fifteen minutes in doses of a teaspoonful added to water. Other less effective antidotes are sulphur and sulphate of iron, also white of eggs and mucilaginous drinks, followed by tonics, as sulphate of iron in small doses, oleaginous purgatives being avoided. A chronic form of arsenical poisoning occurs in the neighbourhood of smelting furnaces in Cornwall and Wales. In this case there is blueness of the gums, swelling of joints, indigestion, and gradual emaciation." Animals should be removed to clean pastures and tonics given.

Lead poisoning usually occurs among cattle grazing over rifle ranges and picking up the spattering from the bullets, or after licking out paint tins on refuse heaps, or from drinking water from newly laid lead-pipes.

"Cattle grind their teeth, have occasional fits of colic, and an unthrifty, staring coat; the abdomen is tucked up, and eventually wasting of the extensor muscles of the limbs comes on." *Treatment*—Give small doses of Epsom salts, which form insoluble lead sulphate, and follow with an oleaginous purgative to clear it out of the alimentary canal.

Vegetable Poisons.—"Four plants of the natural order *Umbelliferæ* are responsible for a great many cases of cattle poisoning—hemlock, *Conium maculatum;* fool's parsley, *Æthusa cynapium;* water dropwort, *Œnanthe fistulosa;* and water hemlock, or cowbane, *Cicuta virosa*, the two latter plants growing in running water and swampy places. When cattle go out in early spring on bare pastures, they seek green herbage near the edges of streams and in marshy ground, and browse off these plants with fatal results. The cattle stagger, then become paralysed in the hind-quarters; the eyes become dilated and glassy in appearance; finally they become comatose, and death is painless." *Treatment*—Apply cold water to the head and give 1 quart linseed oil and chloral hydrate in 4-dram doses. Before turning cattle out to graze, the pastures should be examined and poisonous plants removed.

Belladonna Poisoning.—In dry, hot summers when grass is scarce, cattle pick about hedges and waste places, near old buildings where the deadly nightshade, *Atropa belladonna*, grows. "**The symptoms** of poisoning from this drug are short and quick breathing, signs of excitement, eyes widely dilated, colicky pains, stiffness of hind limbs." *Treatment*—Give laudanum in 2-oz. doses in oil every three hours till symptoms are relieved, and cold applications to the head, and bleeding in the excited stage.

Ergot of Rye.—Ergot is a fungus which attacks the flowering heads of grasses generally, and is never found on the leaves. Cases of ergotism occur only when grasses are in flower or seed. Rye grass and several other large-seeded grasses are very susceptible of attack, and are liable to produce injury. The fungus may also be found on certain of the small-seeded grasses, as on benty pastures, which on account of the wiry nature of the herbage have not been closely eaten in spring.

> "Ergot causes abortion in cattle and horses, but rarely in sheep. The smaller ruminants are not far enough advanced in pregnancy in the late summer and early autumn when the ergot appears. Ergot produces symptoms of poisoning other than abortion, namely intestinal pains, diarrhœa, and ulcerated eruptions on the lips, and the animal becomes dull and comatose, and finally paralysed, especially in the hind limbs."

In chronic cases the lower extremities become gangrenous and the hoofs slough. The animals die of starvation if not attended to. The stock should be removed to fresh pastures, and the symptoms usually pass off naturally, although relapses occur for a considerable time. As a preventative all affected seed-stems should be mown, swampy places drained and improved, and ditches and hedge sides trimmed.

Acorn poisoning takes place when large quantities of green acorns are blown down early in the season from oak trees growing in pasture. Serious loss from death often occurs among young stock (milch cows and cattle over three years old being generally immune) through the irritation produced in the stomach and bowels due to their eating immature acorns. After a strong wind cattle should be moved to pasture away from oak trees, and the fallen acorns must be collected (for the use of pigs during winter) before the animals can be safely returned. Pigs eat only the kernel and reject the husk. No effective remedy has yet been discovered, but it is usual to give oil and stimulants, with the tinctures of gentian and nux vomica in 1-oz. doses, to promote the peristaltic action of the bowels in cases of constipation, and to support the strength with gruel. Leaflet 13 of the Board of Agriculture and Fisheries says:—

> "The true acorn disease (which appears generally after a long, dry and hot summer) is distinguished by progressive wasting, entire loss of appetite, diarrhœa, discharge of an excessive quantity of pale urine, sore places inside the mouth, discharges from the nostrils, and also from the eyes, which are always sunken, giving to the animal a peculiar haggard expression. No fever is present from first to last, but, on the contrary, the temperature is commonly below the normal standard."

Meadow saffron, *Colchicum autumnale*, found growing wild in rank wet pastures and meadows, produces a reddish purple flower in autumn after the leaves have died down. The bulb is the most poisonous part, but the leaves and stems in hay have proved fatal to horses. "Animals that have eaten any part of the plant show intestinal pain, loss of appetite, flatulence, and blood-stained diarrhœa; sometimes they are delirious, sometimes comatose." *Treatment* is the same as that used for acorns, or demulcent drinks, as wheat-flour gruel, preceded by a purgative.

Yew tree leaves at certain periods of the year are deadly poison to cattle and horses. But in moderate quantity yew is not always poisonous.

Horses are much more susceptible to the effects of yew than cattle. "The first intimation that a horse has eaten yew is usually to find it dead"; cattle, on the other hand, may at certain seasons eat quantities of yew without any marked injurious effects, or they may show the following **symptoms**—great tympanitis, rapid breathing, green and fœtid diarrhœa, and dullness followed by death. *Treatment*—Use the trocar and cannula to relieve the tympanitis, and give a strong purgative of Epsom salts followed by stimulants.

Yew trees and hedges should be railed off, and at such a distance that stock cannot reach them. The young shoots are the most dangerous, and in the semi-dried condition; therefore care should also be taken that the clippings from yews are not thrown on rubbish heaps to which stock have access.

Rhododendron poisoning has been observed and reported many times in this country and abroad. While young horses die after eating the leaves, ruminants mostly recover after showing symptoms of alcoholic intoxication and profuse vomiting.

Box-plant clippings thrown on the pasture have been responsible for fatalities in young cattle. Delirium, trembling, paralysis, rolling of the eyeballs, champing of the jaws, and straining were the symptoms observed.

Strong black coffee for box and bicarbonate of soda (2-oz. doses) for rhododendron poisoning are the **remedies** suggested.

Laburnum seeds, picked up usually in the pods that fall on the ground, produce paralysis of the hind limbs, great constipation, coma, and death. *Treatment*—" Rub the legs and spine with a stimulating liniment, and give purgatives and stimulants."

Mustard is at times present as an impurity in Indian rape cake, and acts as an acute irritant to the bowels. The low-priced Indian pulses and other seeds would be in much greater repute among cowkeepers but for the impurities, which make the food too hot or irritating.

Bites from vipers cause swelling of the tongue, and this may be sufficient to produce a fatal result from asphyxia.

THE OX WARBLE FLIES.

(*By Dr Stewart MacDougall, M.A.*)

Hypoderma bovis and *Hypoderma lineatum*, two species of flies found in England, Scotland, and Ireland, as well as on the Continent of Europe and in America, belong to the *Œstridæ*, in which the mouth-parts are rudimentary or absent, so that they cannot feed or wound the skin. The approach of the fly for the laying of her eggs makes the cattle so restive that they rush about. The larva is an internal parasite. There are four, perhaps five stages in its growth, beginning with the entrance of the newly-hatched larva into the skin, and ending with the full-fed larva pressing itself out through perforations in the skin of the back to fall to the ground for pupation. These exit holes spoil the hide for tanning purposes.

Early pioneers who published observations on Bot flies were Brocy Clark, in England, in the end of the eighteenth and the beginning of the nineteenth centuries, and Brauer, whose monograph on the *Œstridæ* appeared in 1863 and was followed by much controversy. The recent experimental work of Professor G. H. Carpenter and his colleagues in Ireland, has cleared up many difficulties and given us an accurate knowledge of the life-cycle of the Hypoderma flies. Curtice and Riley were early workers on Warble flies in the United States, and Miss E. A. Ormerod in this country. Valuable investigations have been made recently by Hadurn, in Canada, and by entomologists in Holland, Germany, and Scandinavia.

Hypoderma bovis measures just over half an inch, and at first sight suggests a bee in hairiness and colour; the face and head are yellowish, the front part of the thorax is covered with yellow hairs, and the part behind this is black; the hind edge of the thorax is also black, but just in front of this black edge is a band of yellow hairs. The abdomen is hairy, yellow or yellow-white in front, black in the middle, and orange-yellow behind. The two flying wings have a brownish appearance, the veins being dark brown.

As compared with *Hypoderma bovis*, *H. lineatum* is slightly smaller; its most characteristic feature is that nearly the whole thorax has black and white hairs, with dark longitudinal lines running down it.

The eggs of both are white and elongate-oval, each provided with a grooved stalk which fits over the hair and so helps to clasp the egg to it. *H. bovis* lays her eggs singly on a hair, *H. lineatum* lays several together.

In the final stage the larva of *H. bovis* is barrel-shaped and measures up to 1⅛ in. long; the skin is thick and rough and very muscular; transverse bands of spines are evident, but are absent on the joint in front of the last one; on the hind face of the last segment are two somewhat kidney-shaped spiracles.

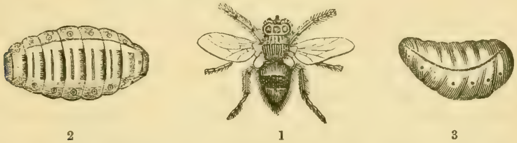

FIG. 17.—1. OX WARBLE FLY (*Hypoderma bovis*); 2. MAGGOT; 3. CHRYSALIS. (*After drawings by Miss Georgiana Ormerod.*)

The final stage larva of *H. lineatum* has rather a stronger armature than that of *H. bovis*, and the joint in front of the last one shows the spines both on upper and on under surfaces; the larva is also rather narrower or thinner.

Typical life-history of *H. bovis*.—The flies are active in the sunshine. The female pushes her ovipositor down and lays an egg near the base of a hair on the legs, preferably on the heel or hock-joint of the hind limbs. The laying of many single eggs keeps the fly changing its position, and this helps to irritate cattle and "gadding" results. An egg hatches in three or four days, and the larva crawls to the bottom of the hair, cuts its way into the skin by its mouth-hooks, and disappears for a number of months. It is next found in the gullet, where it remains for a considerable time before again travelling, this time to reach the under side of the skin of the back. Tumours appear, and through each swelling the larva makes a breathing passage to the outside, and lies in its cell with its hind spiracular end nearest the opening. This cavity exudes blood and pus, which serve to nourish it. When full grown it presses itself out of the orifice, and falling to the ground takes shelter, and after a period of quiescence, pupates under cover of the last moulted larval skin. This case or puparium, brown at first, darkens to black, and the fly escapes by pushing off a lid at the narrower end (in about three or four weeks after leaving the host) in warm and favourable seasons; the whole life-cycle taking a year, eight or nine months of which are spent as a larva. The flies appear in June, July, and August. February, March, and April are the commonest months for the swellings to show, but they can be felt and seen earlier and also later. The life-cycle of *H. lineatum* is similar to that of *H. bovis*, with slight differences in the time of appearance and the habits of the fly.

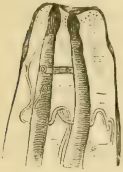

FIG. 18.—BREATHING-TUBES OF WARBLE MAGGOT MAGNIFIED.

It was at one time thought that the larvæ were licked into the mouth to reach the gullet directly.

Injury Done.—Young "gadding" cattle run and lose flesh; the yield of milk cows suffers both in quality and quantity; and in slaughter-cattle there is great loss from injury to the hides and from discoloration of the flesh.

Methods of Prevention and Remedy.—Efforts to prevent the flies laying on the cattle have not been successful. Squeezing the larvæ out of the cells when all but ready to drop is an excellent annihilative measure, when concerted action is taken over a number of years. Killing the larvæ in the Warbles by applying dressings to close the breathing pores also prevents the development of the fly. The Boards of Agriculture of England, Scotland, and Ireland recommend as a serviceable safe dressing, a mixture of tobacco-powder and limewash.

Two lb. of fresh lime and 4 lb. of tobacco-powder are steeped for twenty-four hours in 1 gallon of water: the liquid strained through coarse muslin or sacking, is applied to the backs of animals by means of a cloth or brush, or still safer a syringe inserted into the opening. Treatment should begin when the swellings show in January or February, and should be repeated periodically till June. The quantity named would serve to dress twelve animals. This pest might, with some difficulty, be entirely stamped out.[1]

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[1] See Chapter XIV. of the *Autobiography and Correspondence of Eleanor Ormerod, LL.D.* (John Murray), for an account of the splendid work of Warble destruction done by the boys of Aldersey School in Cheshire.

CHAPTER XIV

HOUSE-FEEDING OF CATTLE

General Principles of Nutrition—Chemical Constituents of Foods—Calorific or Energy Values—Starch Equivalents—Special functions of Proteins—Albuminoid Ratio—Kellner's Feeding Standards—Other Considerations—Bulk, Palatability, Costive or Laxative Effects, and Influence on Quality of Meat—Regularity in Feeding—Preparation of Food—Examples of Satisfactory Rations—Digestive Troubles and their Treatment—Live-Weight Gains—Cost in Terms of Food—Relation of Carcase Weight to Live-Weight—Smithfield Carcase Competitions—**General Management of Cattle**—Housing—Byres, Boxes, Open and Covered Courts—Size of Lots—Dishorning—General Functions of Live Stock on the Farm—Economics of Cattle Feeding.

THE substances composing feeding stuffs are mineral matter, organic matter, and water. Moisture is present to the amount of 8 to 12 per cent. even in such materials as oilcakes, which have the lowest proportion among common feeding stuffs, while roots contain from 87 to 91 per cent. and occasionally more. Water is, of course, in one sense more important than food, and it is always necessary to see that animals are fully supplied, being allowed free access whenever there is any doubt as to the sufficiency of the water that forms part of the ration. At the same time it is important, particularly when animals are exposed to cold, to avoid burdening their systems with excessive quantities of water—as, for example, by feeding heavily on roots and sloppy foods. The mineral matter, which remains as ash when a feeding stuff is burnt, has also important functions to perform in the animal economy: bone, for example, being largely composed of the mineral substance phosphate of lime. Most ordinary rations, indeed, supply a sufficiency of ash materials, so that ordinarily no practical questions arise in this connection. Exceptionally it has been found in some districts on the Continent, that the natural herbage, and locally grown foods generally, are deficient in phosphate of lime, and that if this substance be not added to the ration, certain diseases appear in the young stock. Again, when wheat offals form a preponderating part of the ration in the case of young growing animals, it has been shown that disease and weakness of the bones may result. In this case it is not a lack of ash but an unsatisfactory ratio between the phosphate and the lime that is the cause, and the addition of chalk or some other basic form of lime is the remedy.

The organic matter of the food materials, apart from the points just noted, is that with which the feeder is concerned. It may be defined as that part of the dry substance which is lost in burning. The various complex chemical substances which compose it fall into two main groups, according to whether or not they contain the element nitrogen. The nitrogenous substances include the **proteins** or "**albuminoids,**" substances like the white of egg, the gluten of wheat flour, or the casein of milk, which have a very complex chemical structure that is not yet fully understood; and the simpler and generally less valuable "**amides,**" which unlike albuminoid substances are incapable of forming flesh. In ripe grain and seeds, practically the whole of the nitrogen present is in the albuminoid form, while in green forage, silage, roots, etc., up to half or more may occur as amides. The important **non-nitrogenous substances** are of three kinds, viz.: (1) **Fats and oils**; (2) **Soluble carbohydrates**, including such substances as sugars, starch, and dextrins; and (3) **Crude fibre,** comprising the coarser sort of cellulose or paper-like substance and woody matter.

These organic substances, in so far as they are capable of digestion and assimilation, have one function in common, that of supplying energy to the animal body. In the event of an available surplus, this energy is stored in the body in the form of fat, body fat constituting a reserve set aside for future eventualities. Thus all the substances in question are capable of giving rise to fat. The energy-value, or as it has been called, the calorific or heat-producing value of a feeding stuff, is thus a measure of its fat-producing power, and it can be found by estimating the quantity of heat evolved in burning, deducting of course the heat-producing value of the portion not digested or used by the animal body. A given weight of fat has about 2·3[1] times the heat-producing power of the same weight of soluble carbohydrate or fibre, while the proteins have a slightly lower value still (·94). The gross energy-value of a feeding stuff can thus be expressed in terms of carbohydrates as follows:—

Percentage of digestible fat × 2·3
plus Percentage of digestible carbohydrates and fibre.
plus Percentage of digestible protein × 0·94.

There is one further important point, however. The animal does not gain to the full extent of this gross energy-value, because it must always expend a greater or less quantity of energy in the work of mastication and digestion. The proportion of the gross energy-value so spent varies with the type of food; materials such as potatoes or maize meal, where the fibre content is low, are easily digested, and nearly the whole of their gross energy-value is available. With wheat straw, on the other hand, more than two-thirds of the total energy-value is dissipated in the necessary work of digestion, etc. Hence, if we take equal quantities of digestible nutrients from maize meal and wheat straw respectively, the *net energy-value* of the one is three times that of the other. It is thus easy to conceive a material of which the net energy or feeding value would be a negative quantity. With a material of very low digestibility and difficult to masticate, the energy spent in working on it would not be repaid in the nutrients digested; and an animal fed on such material would lose weight more rapidly than if it had nothing to eat. Young cattle can be starved to death on poor barley straw. As they grow thinner in condition lice develop in great numbers.

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[1] Some variation of this factor 2·3 is necessitated by the fact that the "fat" as determined by the ordinary analytical methods often contains waxes and other substances of relatively low feeding value. Hence for the "fat" in straw, etc., the factor 1·91 is used, for that in cereal grains 2·12, and for that in oilcakes 2·41.

The availability of the digestible ingredients of a feeding stuff can be expressed in terms of the availability of pure starch, and, as a result of numerous accurate feeding experiments, a whole series of such availability values have been determined. Thus milk, rice meal, maize, and potatoes are fully as "available" as starch, and are given an availability figure of 100. The cereal grains, beans, peas, and the more easily digestible cakes, such as linseed, range from 95 to 99; pasture grass about 90, swedes 85, hay about 70, oat straw 43, wheat straw 32, and so on. Such data enable us to reduce the value, for fattening purposes, of any particular feeding stuff to a single convenient figure, the "**Starch Equivalent.**" This is obtained by calculating the gross energy value, as previously described, and multiplying by the availability fraction. To take an example, the starch equivalent of oats, containing 9 per cent. digestible albuminoids, 5¼ per cent. digestible oil, and 45 per cent. digestible carbohydrates and crude fibre, with an availability value of 95, would be:—

$$
\begin{array}{lcll}
9 & \times & \cdot 94 & = 8{\cdot}46 \\
5{\cdot}25 & \times & 2{\cdot}12\text{[1]} & = 11{\cdot}13 \\
45 & \times & 1 & = \underline{45{\cdot}00} \\
 & & & \ 64{\cdot}59 \times \frac{95}{100} \\
 & & & = 61{\cdot}36
\end{array}
$$

What this means precisely is that 100 lb. of oats have the same value in fattening as 61·36 lb. of pure starch. A table follows, prepared by Dr Charles Crowther, of the composition, digestible ingredients, and starch equivalents of common feeding stuffs.

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[1] See footnote on p. 290.

COMPOSITION NUTRITIVE AND VALUES OF AVERAGE FARM FOODS (compiled by Dr Crowther, late of Leeds University).

FOOD INGREDIENTS.	TOTAL Percentage in Food.					DIGESTIBLE Percentage in Food.			Albuminoid Ratio in Digestible Matter.	STARCH VALUE.[1]
	Total Dry Matter.	Crude Protein (Albuminoid)	Oil.	Soluble Carbo-hydrate.	Crude Fibre.	True Protein (Albuminoid).	Oil.	Carbohydrate and Fibre.		
	%	%	%	%	%	%	%	%		lb.
Cotton Seed Cake	91	41	9	26	8	34	8½	20	1 : 1¼	71
Do. Undecort. Egypt	88	23	5½	33	21	16½	5¼	23	1 : 2¼	43
Do. Bombay	88	20	4¾	35	22	14	4¼	24	1 : 2¼	40
Linseed Cake	89	30	10	35	8	25	9½	31	1 : 2¼	75
Hemp Seed do.	88	28	8	23	23	20	7	19	1 : 1¾	49
Rape do.	91	35	9	28	10	25	7	23	1 : 1½	61
Earthnut do.—Decort.	90	47	8½	25	4	41	8	22	1 : 1	78
Coconut (Copra) do.	90	21	9	42	12	16	8½	43	1 : 4	78
Palm-kernel do.	89	19	7	46	13	16	6½	41	1 : 3½	72
Soy Bean do (Soya do.)	88	43	6	29	4	34	5½	23	1 : 1	68
Soy Beans	89	36	17	26	5	28½	15½	20	1 : 2	82
Linseed	91	23	36	23	6	17	34	21	1 : 5½	119
Dried Yeast	92	48	1	34	1	43	¾	31	1 : ¾	73
Locust Beans	86	5	1½	70	6	3½	1	70	1 : 20	78
Wheat Middlings (Fine)	88	15	3½	62	5	12	3	56	1 : 5¼	74
Do. Sharps (Coarse)	88	15	4½	57	8	11	3½	50	1 : 5¼	58
Do. Bran	87	14	4	56	9	10	3	45	1 : 5¼	47
Oatmeal	90	15	8	60	3	10	7	48	1 : 6½	72
Maize Germ Meal	89	13	12	56	4	9	11	51	1 : 8¾	80
Gluten Meal	90	38	4	45	2	33	3½	42	1 : 1½	77
Do. Feed	90	24	3	56	4	19	2½	53	1 : 3	72
Rice Meal	91	13	13	50	7	7	11	42	1 : 10	72
Malt	92	10	2½	68	8	6	2	63	1 : 11¼	70
Malt Coombs	90	24	1½	48	11	12	1	41	1 : 3½	41
Brewers' Grains (Wet)	24	5¼	1½	12	5	3¾	1¼	10	1 : 3½	14
Do. do. (Dried)	91	20	6	43	17	13½	5½	34	1 : 3½	50
Distillers' do. (Dried)	91	25	10	41	13	16½	9	31	1 : 3¼	55
Molasses = Treacle	78	10	..	60	..	..	..	55	..	48
Meat Meal	89	72	13	..	..	67	12½	..	1 : ½	94
Fish Meal	87	56	5	..	..	47	4	..	1 : ⅙	53
Wheat	87	12	2	69	2	9	1¼	65	1 : 7½	73
Barley	86	10	2	67	5	7	1¾	64	1 : 9¾	74
Oats	87	12	6	55	10	9	5¼	45	1 : 6½	63
Rye	87	11½	2	70	2	9	1	65	1 : 7½	72
Maize	89	10½	5	70	2	7	4½	68	1 : 11¼	84
Beans	86	25	1½	48	7	19	1¼	48	1 : 2¾	67
Peas	86	23	1½	54	6	17	1	53	1 : 3¼	70
Straw—Wheat	86	2	1¼	37	41	¼	½	34	1 : 71	12
Do. Barley	86	3¾	1¼	38	39	¾	½	39	1 : 53	18
Do. Oat	86	3	2¾	41	34	¾	1	36	1 : 50	19
Do. Rye	86	3	1¼	37	41	¾	½	38	1 : 52	16
Do. Bean	86	5	1	30	46	2¼	½	39	1 : 18	16
Do. Pea	86	9	1½	33	36	3½	¾	32	1 : 9½	16
Meadow Hay	86	9	2½	43	25	5	1	42	1 : 9	34
"Seeds" Hay	86	12	2½	40	25	6½	1½	40	1 : 6¾	35
Pasture Grass	20	3	¾	10	5	1½	½	11	1 : 8¼	12
Clover (Green)	19	3½	¾	8	5	2	½	9	1 : 5¼	10
Vetches (Green)	16	3½	½	6	5	2	¼	7	1 : 4	8
Lucerne (Green)	24	4½	¾	9	7	2	½	9	1 : 5¼	10
Cabbage	15	2½	¾	7	2	1½	½	7	1 : 5½	9
Rape	14	2¾	¾	6	3	1½	½	6	1 : 5	8
Turnip Tops	12	2	½	5	2	½	¼	5	1 : 11½	6
Turnips	9½	1	¼	6	1	¼	⅒	6	1 : 25	6
Swedes	11½	1¼	¼	8	1½	¼	⅒	8	1 : 33	7
Mangels	12	1¼	¼	9	1	⅒	⅒	9	1 : 92	7
Carrots	13	1¼	¼	9½	1½	½	⅒	10	1 : 21	9
Sugar Beet	25	1¼	¼	20	2	¼	⅒	20	1 : 81	15
Potatoes	25	2	¼	21	1	⅒	⅒	19	1 : 192	19
Milk—Cow	12½	3½	3¾	4¾	..	3¼	3¾	4¾	1 : 4¼	16
Do. (Skim)	9½	3½	¾	4½	..	3¼	¾	4½	1 : 2	9
Do. (Separated)	9	3¾	⅒	5	..	3½	⅒	5	1 : 1½	8
Do. Ewe	20	6½	8	5	..	6	8	5	1 : 4	29
Do. Mare	9	2	1¼	5¾	..	1¾	1¼	5¾	1 : 5	10
Whey	7	1	¼	5	..	..	¼	5	1 : 5½	6

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[1] Starch equivalent, for fattening purposes, to 100 lb. of the food of the composition given, when added to maintenance ration (Kellner).

"The **factors known as 'Vitamins'** are accessory to the carbohydrates, proteins, and fats of the foods, and are essential to their proper utilisation in the animal body. The factors are termed respectively: fat soluble A, found in association with fats (for example, butter, cod-liver oil); water soluble B, in the skin of rice and in yeast; anti-scorbutic C, in greens, lemon juice, apples, swedes, etc. The absence of B gives rise to a condition favourable to beri-beri, and the absence of C to scurvy, while A is of great importance in dairying."—GOLDING.

The proteins have a special function in the animal economy apart from the general one of providing energy or giving rise to fat. In the case of a growing animal, protein is being added to the body in the form of muscle and other tissue; again, a cow yielding milk has a definite output of proteins in the form of the casein and albumen of the milk. But even in a fattening animal that adds but very little to its quantity of protein, or in a full-grown animal on a bare maintenance diet, there is a certain small continuous wastage of nitrogenous substance which must be made good. Failing a supply of albuminoids in the food, the tissues would begin to waste, and the animal would ultimately die. Hence the starch equivalent is not a complete guide to the value of a ration. In addition to a certain net energy-value, a definite **protein minimum** must be provided. It must be admitted that in the recent past there has been a tendency to place this minimum too high, and to lay down in too precise figures the albuminoid ratio[1]

TABLE OF KELLNER'S FEEDING STANDARDS FOR CATTLE.

	Dry Matter in Ration.	Starch Equivalent.	Digestible True Protein.
	Lb.	Lb.	Lb.
Full-grown Oxen at Rest-maintenance .	15 to 21	6	·6 to ·8
Fattening Cattle	24 ,, 32	12·5 to 14·5	1·5 ,, 1·7
Milch Cow giving 10 lb. milk . . .	22 ,, 27	7·8 ,, 8·3	1·0 ,, 1·3
,, ,, 20 ,, ...	25 ,, 29	9·8 ,, 11·2	1·6 ,, 1·9
,, ,, 30 ,, ...	27 ,, 33	11·8 ,, 13·9	2·2 ,, 2·5
,, ,, 40 ,, ...	27 ,, 34	13·9 ,, 16·6	2·8 ,, 3·2
Young Dairy Cattle—			
3 to 6 months, say 300 lb. live-weight	24	14·7	2·8
6 ,, 12 ,, 500 ,,	26	12·5	2·3
12 ,, 18 ,, 700 ,,	26	10·5	1·8
18 ,, 24 ,, 900 ,,	26	9·2	1·3
Young Beef Cattle—			
3 to 6 months, say 350 lb. live-weight	24	17·4	3·7
6 ,, 12 ,, 600 ,,	26	14·4	2·8
12 ,, 18 ,, 800 ,,	26	11·2	2·2
18 ,, 24 ,, 950 ,,	26	10·0	1·5

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[1] The albuminoid ratio is the ratio of digestible true proteid to digestible non-proteid substances, the latter expressed in terms of carbohydrates.

that is necessary for each class of stock. In the case of cows in milk or in that of young animals, the protein content does indeed demand attention, and there is evidence that neglect of this point is a somewhat frequent cause of unsatisfactory results in practice. But with full-grown or nearly full-grown fattening animals the ordinary rations of the feeder seem rarely to fall short of requirements in the matter of protein content. The foregoing table gives **Kellner's feeding standards** for cattle. The figures are calculated on the basis of 1000 lb. live-weight, and require to be altered in proportion for animals of greater or less size.

The use of these standards may be illustrated by the following examples:—

I. RATION FOR FATTENING CATTLE. Average weight 9 cwts., or, say, 1000 lb. Home-grown materials available: swedes, oat straw, and clover hay. Market feeding stuffs obtainable at reasonable prices: linseed cake, bran.

Ration.	Total Dry Matter.	Starch Equivalent.	Digestible True Protein.	Total Dry Matter in Amount fed.	Starch Equivalent of Amount fed.	Digestible True Protein in Amount fed.
	Per cent.	Per 100 lb.	Per cent.	Lb.	Lb.	Lb.
84 lb. Swedes .	11·5	7	¼	9·6	5·9	·21
10 ,, Oat Straw .	86	19	1	8·6	1·9	·10
5 ,, Clover Hay .	84	31	5½	4·2	1·6	·27
3 ,, Linseed Cake	88	76	25	2·6	2·3	·75
3 ,, Bran . .	87	47	10	2·6	1·4	·30
Totals . .				27·6	13·1	1·63
Standard . .				24-32	12·5-14·5	1·5-1·7

II. RATION FOR YEARLING DAIRY HEIFERS. Average live-weight, 600 lb. Foods available: mangels, meadow hay, oats, and linseed cake.

Ration.	Total Dry Matter.	Starch Equivalent.	Digestible True Protein.	Total Dry Matter in Amount fed.	Starch Equivalent of Amount fed.	Digestible True Protein in Amount fed.
	Per cent.	Per 100 lb.	Per 100 lb.	Lb.	Lb.	Lb.
20 lb. Mangels .	12	9	½	2·4	1·8	·1
10 ,, Meadow Hay	86	31	4	8·6	3·1	·4
1½ ,, Crushed Oats	87	63	9	1·3	1·0	·14
2 ,, Linseed Cake	88	76	25	1·8	1·5	·50
Totals				14·1	7·4	1·14
Standard per 1000 lb. L.-W. . .				26	10·5-12·5	1·8-2·3
,, ,, 600 ,, . .				16	6·3- 7·5	1·1-1·4

This last ration is slightly below the standard in dry matter, but a difference of this amount would be of no consequence.

It may be said, in general, that the standards are not intended to be adhered to with minute accuracy. If a ration is known to give good results in practice, there is no need to calculate whether it conforms absolutely to the standard. When, however, the farmer is called upon to feed a class of stock, or to use a feeding stuff to which he is unaccustomed, the standards afford **real practical guidance.** It is often rather noticeable, for example, that in cattle-fattening districts the few dairy cows are often badly fed, while on dairy farms the occasional lot of feeding steers is often very expensively if not badly rationed.

It must be said that there is **one point** in the theory of nutrition that has not been fully cleared up, that is the question whether the proteins can be to any extent replaced by amides in the ration. In general it would seem that they can be so replaced only to a very limited extent, but ruminant animals appear to form an exception. That young cattle should live and thrive on a ration of swedes and oat straw, which provides only a small fraction of the standard quantity of digestible true protein, indicates either that the protein requirement has been placed too high, or else that the true proteins are replaceable to a very considerable extent by the amides.

Apart from the chemical aspects of the matter, there are many important **practical questions** that arise in feeding. That of bulk has already been alluded to, and the object of including a figure for "total dry matter" in the feeding standards is to provide guidance on this point. Obviously there is a maximum bulk that the animal will consume, and this may be said to be reached with cattle when the total dry matter of the ration approaches 3½ per cent. of the live-weight. On the other hand cattle will not thrive on too concentrated a ration—that is one consisting too largely of cakes and meals. They become tucked up, lose the characteristic bloom of healthy animals, and are liable to go "off feed."

Again, the ration must be at least moderately **palatable,** otherwise the animal will not eat quantities sufficient to produce economical gains, for live-weight increase is proportional not to the quantity of food eaten but to that part of the ration which is surplus to maintenance requirements. Thus if 6 lb. starch equivalent is necessary for maintenance, and a total ration of 12 lb. produces a live-weight gain of 2 lb. per day, a beast which consumes a starch equivalent of 9 lb. only will make but 1 lb. of gain per day, and will obviously be much less efficient as a producer of beef. Apart from this point there is some evidence that food that is fully relished is more completely digested and assimilated than what is eaten with indifference. In general this matter of palatability sets a limit to the quantity of straw that can be fed. With straw of inferior quality it sometimes happens that cattle of average weight will consume no more than 8, 10, or 12 lb., and the other constituents of the ration must be given in correspondingly increased quantity. Succulent materials, on the other hand, such as roots or well-made silage, add to the palatability of the ration as a whole.

The **costive or laxative** effects of different feeding stuffs also require consideration in compounding rations. Roots, especially during the earlier part of the season, potatoes, fresh succulent grass, linseed cake, etc., have marked effects in producing looseness, and excessive looseness means a loss of live-weight increment. Rye grass or meadow hay and undecorticated cotton-cake have the opposite tendency and may usefully be fed as correctives. Attention to this matter is particularly important when changes are made from winter to summer food, and *vice versa.* Such changes should always be made gradually, and any tendency to excessive looseness should be corrected in the manner indicated.

The quality of the meat is affected to some extent by the feeding stuffs used during the last few weeks of the fattening process. The most notable deleterious result is produced by large quantities of food-stuffs rich in oil, the animal fat tending to partake of the nature of the oil fed. Oily foods should therefore be given in moderate quantities during the last few weeks of the fattening period. Kibbled beans and bean meal fed dry, on the other hand, give most satisfactory results in hardening the touch of bullocks getting into prime condition. Very watery rations again, such as are obtained by using excessive quantities of roots, wet grains, or distillery dreg, give a poor dressing percentage and a soft watery carcase that is not liked by the butcher. Apart from this, whenever finished cattle have to travel considerable distances to market, it is important so to modify the ration as to reduce the "sinkage" of live-weight in travelling. Hay and undecorticated cotton-cake are very useful in this connection.

Regularity in feeding is of first importance. If a meal is delayed even by half an hour beyond the usual time, cattle will become restless and unsettled and fail to make maximum gains. Attention to this essential duty, and a capacity for, and habit of, **close observation** of the individual animals, are the chief marks of a good cattleman. In order that he may have opportunity to make the best of his animals, it is important that he should not be burdened with an excessive number of stock. The actual number that can be allotted to an active skilled man varies with the degree of convenience of the feeding arrangements, *e.g.*, the distances between the straw and root sheds on the one hand, and the racks and troughs on the other. In general 70 or 80 head is about the maximum when the cattle are in courts, and 50 or 60 when they are in byres.

Elaborate methods of preparing food are generally unprofitable. Cooking of ordinary food-stuffs is never to be recommended, as it destroys certain natural enzymes or ferments present in them, and lowers their digestibility. For young cattle that are changing teeth, roots must be sliced or pulped. There is probably some advantage to be obtained in chaffing a part of the hay or straw; hay in particular is more completely consumed if it is chaffed, damped, and fed in troughs, than if fed long in racks. Hard grains, such as maize or barley, must of course be ground or soaked, otherwise a proportion will escape mastication, and will reappear whole in the droppings in a condition fit for germination; nevertheless, corn-cobs and alfalfa or timothy hay form ideal food for cattle crossing the Atlantic. The practice of mixing chaffed straw with pulped roots and allowing the whole to ferment before feeding, is of doubtful economy, and does not further the production of good beef.

The actual feeding stuffs used to form the ration must depend on the home-grown materials that are available, and on the ruling prices of such as are obtainable on the market. It is well to avoid excessive quantities of any particular component, even when such is relatively cheap. Thus the root ration should not exceed, say, 9 or 10 per cent. of the live-weight, or 90 to 100 lb. for a 9-cwt. steer; and under British conditions 6 to 8 lb. of concentrates should be regarded as the normal maximum. Both roots and concentrates should be included if possible, the former as tending to improve the palatability, and the latter as making it possible to obtain a sufficient starch value in a moderate bulk. The following **rations for fattening cattle** are among those suggested by Dr Crowther. The figures apply as before to animals of 1000 lb. or, say, 9 cwts. live-weight:—

I. 98 lb. Swedes.
14 „ Oat Straw.
3¾ „ Undecort. Cotton Cake
2½ „ Linseed Cake.

II. 70 lb. Swedes.
16 „ Oat Straw.
4¼ „ Crushed Oats.
2¼ „ Decort. Cotton Cake.
1 „ Maize Meal.

III. 28 lb. Swedes.
14 „ Hay.
7 „ Oat Straw.
4 „ Crushed Grain.
3 „ Undecort. Cotton Cake.
1¾ „ Locust Bean Meal.

IV. 35 lb. Mangolds.
7 „ Hay.
14 „ Oat Straw.
4½ „ Wheat Meal.
3½ „ Bean Meal.

V. 28 lb. Hay.
4 „ Maize Meal.
1¼ lb. Dried Grain.
¼ „ Crushed Linseed.

Touching the **arrangement of the diet**, the particular system adopted is of less importance than strict regularity in its observance. The root ration where heavy, should be given in three meals, if moderate, in two. If concentrate is being fed in excess of 4 or 5 lb., it should be offered in two meals. Racks should be filled in the morning, and again in the late evening, hay, when used, being reserved for the last meal of the day. It is good, if it can be made to fit in with the labour arrangements, to allow the animals a period of, say, two or three hours in the middle of the day to rest and ruminate. The following might be a typical scheme:—

6.30 A.M.	Give one-half the concentrates.
7.30 „	„ one-third of the roots.
9 „	Clean out racks and fill up with straw.
10.30 „	Give one-third of roots.
2.30 P.M.	„ half the concentrates.
3.30 „	„ one-third of roots.
5.30 „	„ chaffed hay, if any, and refill racks.

The live-weight increase of fattening cattle fed on such rations as those quoted above should be about **2 lb. per head per day**. If the concentrates are reduced to 2 or 3 lb., as may occasionally be found economical, 1½ lb. of gain would be satisfactory. In America and other countries where cattle are fed very intensively on maize, being given up to 20 or 25 lb. per day, gains of over 3 lb. are frequently recorded over short feeding periods. Such methods, however, can only prove financially successful when cheap supplies of concentrates are available. As a rough rule it may be said that, with good methods, a starch equivalent of 6 or 7 lb. should produce 1 lb. live-weight increase. The gain is of course not constant throughout the feeding period, but declines markedly as the cattle approach prime condition. During this period the percentage of dressed beef in the gross weight increases, and the quality of the meat improves, so that the value per live hundredweight rises. The point of fatness at which it is most economical to stop the fattening process is a matter requiring considerable judgment, and of course varies with market conditions, in particular with the relative supplies of prime and moderately fat beeves. It is impossible to say whether the mistake of keeping too long or of marketing too soon is the more common. Mistakes in both directions undoubtedly occur.

The **dressing percentage**, or the proportion of carcase weight to the "fasted live-weight,"[1] varies according to age, type and "condition," or degree of fatness. The proportion rises with increasing age and with increasing degree of fatness. General type of animal has also a large influence, it being obvious that small bone and light hide and offal are correlated

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[1] "Fasted live-weight" in this country implies that the animal has not eaten for twenty-four hours. In America the accepted period is twelve hours.

American method of cutting up a carcase of beef illustrated.

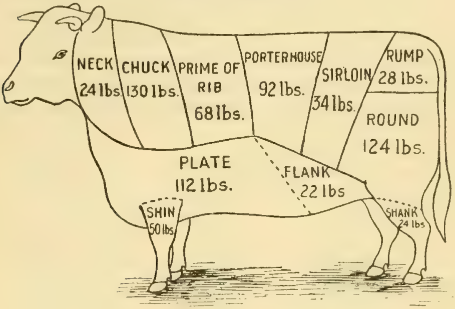

FIG. 19.

British method of cutting up a carcase illustrated.

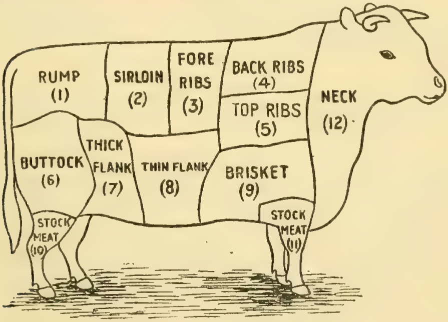

FIG. 20.

with a high percentage of carcase. It may be reckoned (1) that prime fat bullocks will yield 60 per cent. of beef from the fasted live-weight. (2) Average market animals yield 57 or 58 per cent. of carcase. (3) Wastefully fat exhibition animals yield about 70 per cent. (4) Extra prime show beasts yield 66 or 67 per cent. (5) Young animals and cows in lean condition may yield as low as 50 per cent., or occasionally less. The dead-weight of an animal can be estimated with fair approximation by **measurement**. One of the simplest of the various rules is as follows:—

> "Measure the length from the 'square' of the shoulder to the 'square' of the buttock; measure the heart girth. Multiply the length in feet by the square of the girth in feet and by ·24 or ·25 or ·26 according as the animal is in moderate, medium, or prime condition. The answer should be the weight of the carcase in imperial stones." (See Appendix Z.)

The practice of **selling** both fat and store animals **by weight** has long been adopted in America and is making steady progress in this country, though it is yet by no means universal.

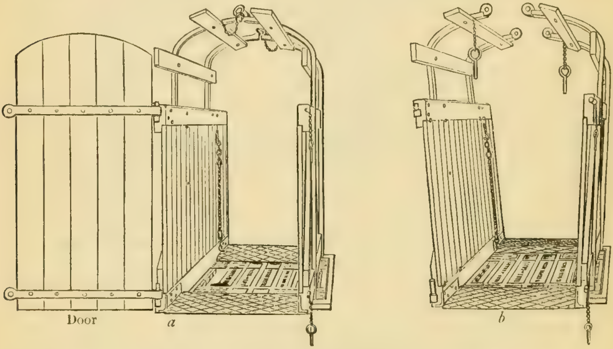

FIG. 21.—CATTLE-WEIGHING CAGE.[1]

(*a*) Bolted and immovable with a weigh-table 9 or 10 ft. long.

(*b*) Open and removable in two sections, 6 ft. 4 ins. high.

There can be little doubt that without the aid of the scales the ordinary farmer, with his relatively slender experience, is placed at a great disadvantage in his dealings with middlemen. A cattle-weighing cage is a very useful addition to the equipment of feeding farms, as it enables the feeder to get definite information regarding the live-weight increases of his beasts. A good cage is illustrated in the accompanying figure.

An important point in the general management of cattle is to keep watch for **digestive disturbances**. An animal that is simply "off feed" should be drenched with salts and treacle and linseed oil as soon as the trouble is observed. **Chronic indigestion** is not uncommon among house-fed cattle when the food is too dry and fibrous. Affected animals do not ruminate freely, and may grind their teeth and grunt. They may be either distended with flatulence or "tucked up" in the belly, constipated, or passing fæces in small quantities. Salts and treacle, followed in a day or two by linseed oil, constitute the usual treatment. Strength should be maintained with drenches of oatmeal gruel, to which 1 oz. powdered gentian, 1 oz. of powdered sulphur, and ½ to 1 oz. carbonate of ammonia may be added. Long fodder is withheld, but only for a short time, as rumination will not be restored without it.

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[1] A development of M'Jannet's cage with index-dial actuated by the weigh beam, and self-locking doors; made by W. Smith and Co., Engineers, Barony Place and New Broughton, Edinburgh.

Acute indigestion is not so common as the chronic form, except among town dairy cows that are very heavily fed, but it is apt to occur with often startling symptoms when the food is suddenly changed. The animal suffers from great thirst, and will not eat or chew the cud; it groans or paddles with the hind feet from pains in the belly, and irritable passage of fæces occurs. In bad cases the acute symptoms are expressed by the animal standing with arched back and with all four legs drawn together, a dry, staring coat, high temperature, rigors, and saliva streaming from the mouth. Occasionally brain affections—coma and delirium—occur. The *treatment* is to give a purgative followed by stomachics—carbonate of ammonia and tincture of nux vomica, or gentian in 1-oz. doses in oatmeal gruel. Day's drenches are in much repute among cowkeepers.

There are **three common methods of arranging cattle** in a house to feed.

1. Tying by the neck in byres which may be divided into double or single stalls, or undivided, the first being probably best.
2. Putting them into loose boxes, either singly or in pairs.
3. Leaving them untied, several together, in covered or partially open courts.

In byres cattle may be arranged, if in more than one row, either with their heads towards a central feeding passage and with a manure passage along each side wall; or alternatively facing the side walls, with a manure passage in the middle and with or without feeding passages in front. Double stalls should be from 6 ft. 3 ins. to 7 ft. 3 ins. wide, depending on the average size of the cattle. It is important that they be no wider than is necessary for comfort, otherwise the animals are liable to turn some way round in them and to soil the bed of their fellows. The length, except for animals of extreme sizes, should be from 5 ft. 6 ins. to 6 ft., measured from the rear of the manger to the front of the manure channel. If stalls are too long the animals tend to lie down in their droppings, while if too short they are forced to stand with the hind feet in the manure channel. The manger should be 2 ft. wide or more, and the bottom should be of glazed earthenware, and capable of being periodically swilled out. A small water trough, large enough for one animal to put its nose into while drinking, can be erected at a height of about 15 ins. to 18 ins. between two beasts over the front edge of the feeding trough to supply water at will, which, being natural, is a great advantage. So placed it is out of the way of fodder and other food-stuffs.

Ventilation is of paramount importance and can best be secured by an arrangement of intake holes in the walls, near the floor, each fitted with a sheet of perforated galvanised iron to break the force of the current, together with outlets in the roof. Where the heads of the cattle are close to the wall it is well to have a 3 or 4-in. pipe passing through it and slanting upwards between the cattle in each double stall. The current must not strike the animals. There is no sufficient body of evidence on the relative efficiency of byres as compared with the other types of housing. The byre system is economical of litter, 7 lb. of straw per head per day being ample with reasonable care, and in case of scarcity, litter can be dispensed with entirely; but it is wasteful of manure, as the latter is necessarily removed and is usually left exposed in loose heaps where it suffers very serious loss, amounting to over half its value within twelve months. Feeding and tending require more labour than with the other types of housing, for individual rations have to be doled out and the stalls have to be cleaned. Moreover, tied-up cattle require to be groomed, especially about the rump, shoulder, and neck—such parts as they cannot reach with the tongue. Intensive feeding of young cattle cannot well be carried out in byres, the lack of exercise being the difficulty.

Boxes, which should be about 10 ft. square for single cattle and 12 or 13 ft. square for pairs, probably constitute the ideal method of housing, in so far as concerns the health of the cattle and the economy of gains. The system permits of close individual attention, and gives a minimum of disturbance with just sufficient freedom and exercise. Labour, too, is reduced as compared with stall feeding, as the manure may be allowed to accumulate under the cattle, and grooming is generally unnecessary. But the system is expensive in the matter of space. Moreover, the manure is not uniformly "made," being mixed with dry litter from the edges of the boxes where it escapes treading, and it is consequently rather troublesome to deal with.

Courts should be partially open when they are intended for young store cattle, as in this case general health and vigour, and consequently fresh air and exercise are of prime importance. Young cattle that have been kept warm and closely confined always compare unfavourably as grazers with such as have been wintered partly in the open. For fattening cattle, on the other hand, open courts have no advantage. Moreover, they are expensive in litter and wasteful as regards the valuable constituents of the manure. Courts should not be too large—they may suitably be of size to contain 8 to 15 or 20 beasts. Courts have the advantage of economy in labour, and when covered, give by far the most satisfactory results in the making and preservation of manure. On the other hand, there is the liability of the cattle to mutual disturbance, a single restless and bullying animal sometimes causing a considerable diminution in gains throughout an entire lot. Moreover, the weaklings and beasts without pluck frequently go hungry and make very slow progress. These disadvantages can be largely avoided if each lot of cattle has been made up some time before housing and grazed together. In any case, it is an advantage to have a few stalls in a byre, or a few boxes, in which the bully and the weakling can be segregated as soon as they are observed.

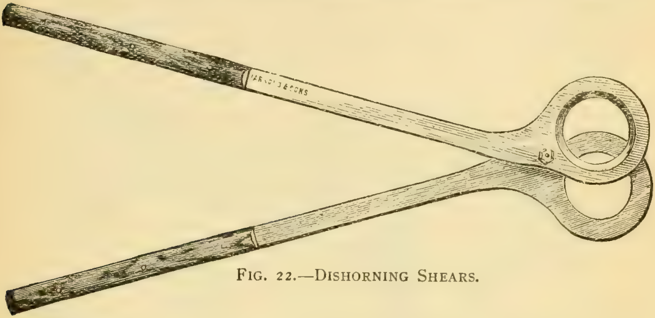

FIG. 22.—DISHORNING SHEARS.

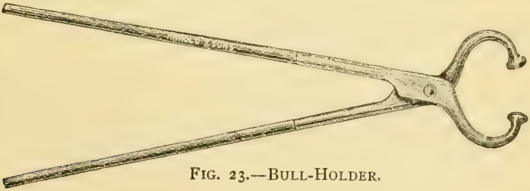

FIG. 23.—BULL-HOLDER.

Dishorning, which is legal in Scotland and Ireland, but illegal in England, should be practised on all cattle that are to be housed in courts, as if this is omitted they persistently torment each other and frequently inflict severe injury by horning their neighbours. When the horns are well developed and strong, the sharp tips are frequently nipped off by a pair of powerful shears (Fig. 22). This method is quicker, more simple, and less painful than that of sawing the horn, the animal's head being fixed by a pair of long-handled bull-holders (Fig. 23). "Half-horning" (see Fig. 24) can also be accomplished with shears, unless the horns are exceptionally large, but full "dishorning" requires the use of a saw, the animal being roped to a strong pillar or thrown in the usual way with ropes (p. 259) and made fast. Dishorning, a somewhat severe operation, is generally without serious after-effects, but in occasional cases it is followed by an elevation of temperature and suppuration in the sinuses of the skull, which throws the animal back in condition very seriously. By far the most

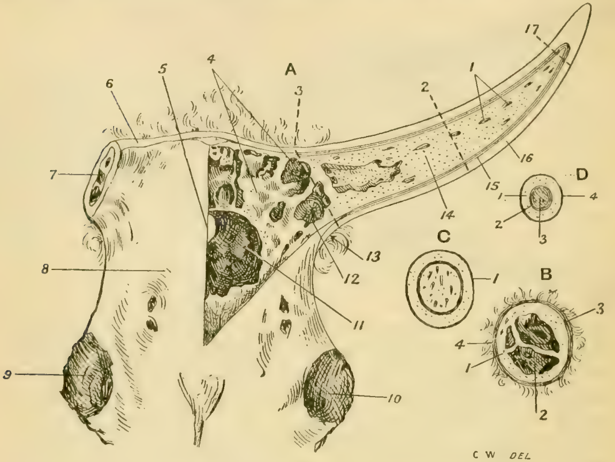

FIG. 24.—**Skull and Horn of an Ox, to illustrate the operations of "Dishorning," "Half-horning," and "Tipping."**

ILLUSTRATION* exhibiting a triangular section of the Frontal Bone excised to show the bony structure behind; the Right Horn removed as it ought to be, in Dishorning; and the Left Horn bisected to show its internal parts.

A—1. Blood-vessels; 2. Cut made in "half-horning"; 3. Cut made in "Dishorning"; 4. Bony Walls of Frontal Sinuses; 5. Position of Spinal Column; 6. Skin; 7. Part from which the Right Horn has been excised; 8. Frontal Bone (Forehead); 9. Orbit of Right Eye; 10. Orbit of Left Eye; 11. Brain Cavity (2½ inches in this case from the Wound made in Dishorning); 12. Frontal Sinuses (or Cavities in the Skull containing air, and opening into the Nasal Cavity); 13. Region where the Trunk Nerve and the two main branches of the Artery enter for the supply of the Horn; 14. Bony Horn-core (insensitive when healthy, but extremely painful when diseased or congested); 15. Corium, a sensitive membrane, corresponding to the true skin; 16. Insensitive Horn; 17. Cut made in "Tipping." B—Section made by "Dishorning." 1. Bone; 2. Sinus; 3. Skin; 4. Weak Horn. C—Section made by "Half-horning." D—Section made by "Tipping." 1. Horn; 2. Corium; 3. Bony Horn-core.

* After a drawing by C. Ward, M.R.C.V.S., made under the direction of Prof. W. O. Williams.

desirable method of getting rid of horns is to prevent their development altogether.[1] This can be easily accomplished by rubbing the skin firmly over the centre of the budding horn, when the calf is from two to five days old, with a stick of caustic potash, the hair being previously clipped off and the stick or the bare parts being first moistened.

While dishorning is chiefly necessary as a preparation for the shutting up of cattle in confined courts, the practice is deserving of much more general adoption, and its legality in the name of humanity should again be tested in the English Law Courts.

In an English case—Lewis *v.* Fermor—in the Queen's Bench Division, it was laid down that there was no contravention of the Act 12 and 13 Victoria, chap. 92, when a painful operation was performed on an animal with reasonable care, and for the bona-fide purpose of benefiting the owner, even though the operation was, in fact, unnecessary and useless.

It has been roughly estimated that the average loss on horned cattle during shipment from Ireland to Great Britain amounts to ten or fifteen shillings a head, due to horn wounds and bruises. In Britain the practice is largely confined to steers, but in the United States cows, even pedigreed animals of the best class, are frequently treated or operated on. In the United States, too, the disadvantage of horns is so widely recognised that there is a general tendency to produce polled strains of many of the ordinarily horned breeds, and thus to breed the horns off in preference to cutting them off (see Polled Shorthorns, p. 91, and Polled Hereford, p. 115).

In the north, **cattle should be housed** by the end of September or beginning of October; in the south, before the beginning of November. It is a serious error to leave feeding cattle out at night in early winter without proper protection from the inclemency of the weather. Not only do they lose flesh, but when housed they take a considerable time to recover from the "backset" they have received.

It must be clearly pointed out **in conclusion** that economic considerations in cattle feeding often outweigh those of a technical kind. It is sufficiently well known, for example, that in the past many men who have been regarded as excellent feeders, and who have produced excellent butchers' beasts, have lost money heavily and continuously by their cattle. The commonest mistake has been the excessive use of expensive concentrates, arising out of an exaggerated estimate of their feeding and manurial value. It has been demonstrated beyond doubt that the manuring of the land through the feeding of rich purchased foods is wasteful and otherwise less satisfactory than by the direct application of artificials. On many farms, particularly on the better sort of arable land, cattle, and indeed live stock in general, are to be regarded not so much as a source of profit in themselves, but rather as a convenient means for the disposal of bulky unmarketable produce and also of keeping up the mechanical fertility of the soil by the conversion of straw and other by-products into farmyard manure. The problem frequently amounts to that of securing this end with a minimum of financial loss on the animals. When such conditions obtain, it is obvious that the purchase of expensive feeding stuffs beyond the minimum necessary to secure reasonably balanced rations, can lead only to increased losses. The late **John Ross**, Millcraig, N.B., a feeder of probably unsurpassed experience and showyard success, summed up the matter well. He regarded a ration of 6 lb. rising to 10 lb. of concentrates as above a paying amount, when young, well-bred, and properly reared animals are being fed. "Such animals should be ready for the butcher at from eighteen to twenty-four months old without ever, in one day of their lives, consuming 6 lb. of cake or meal." Profit can now only be secured "along the lines of careful, economical diet, making the most of the best of the home produce, and using merely what is necessary of imported food to balance the deficiency of oil or albuminoids."

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[1] See Ministry of Agriculture Leaflet No. 81, "A Substitute for Dishorning."

CHAPTER XV

DAIRYING—PASTURE AND FOOD

Conditions, Suitable and Unsuitable—Best Dairying Localities—Cow Pasture—Water Supply—Natural and Artificial Herbage—Weeds—Extent of Dairy Land—Percentage Composition of Milk of Different Breeds—Show of the British Dairy Farmers' Association—Tables of Results of Milking Trials at the Dairy Show—Table of Champion Butter-Fat Records of Five Cows belonging to Four Breeds—World's Record Cows.

CONDITIONS, **suitable and unsuitable.**—The climate is the only limit to success in dairying in this country, and that on account of the wet and cold of the higher of the hilly regions. All other difficulties—deficient rainfall and clay-soil (such as the heavy clays near London) that, not so long ago were thought unsuitable—can be dealt with by adopting one of the many varied systems of dairying practised in England. There is a choice of—(1) "soiling," viz., keeping the cows entirely indoors and carrying all green and other food to them, or (2) pasturing during the growing season, besides (3) many combinations or variations of the two plans.

Dairying is more **remunerative** in some localities than in others, owing to local favourable conditions; but the absence of some of these does not necessarily exclude the practice of dairying as a successful industry. The districts in England of most renown in this respect are—parts of the counties of Cheshire, Derby, York, Leicester, Gloucester, Somerset; and in Scotland—Wigtown, Kirkcudbright, Dumfries, Ayr, Renfrew, and Lanark. Such places possess the soil and the climate suitable for growing good grass, which is the best and cheapest food for dairy cows—grass in summer, and hay in the winter months. Roots were at one time considered indispensable, and it was thought that if roots could not be profitably grown, dairying need not be attempted; but now that the aroma and flavour of milk and its products receive consideration, roots, for reasons to be explained later, are not so popular, and the success of silage in places uncongenial for their growth has made them less essential.

Extremes of heat or cold are disadvantageous, but these are not so great in this country, except on high cold mountain-ranges, that they cannot be overcome by shelter. Summer shelter is necessary for protection against the sun and flies in warm weather, and from wind and rain while it is stormy. This may be secured by tall hedges, belts of plantation, high stone walls, or low-roofed open sheds. Winter shelter is usually given by housing, except in a few mild districts—as in Cheshire, where cows lie out all winter. There the shelters provided in summer prove valuable. Extreme cold reduces the flow of milk; and excessive heat, with its various accompanying irritations, lowers both quality and quantity. There is no animal product of the farm so easily affected by adverse circumstances as milk. Materials for its secretion are provided by the cow after the other demands of the animal system have been supplied; consequently, the maximum of milk production can be attained only when the cow is free from all discomforts, so that she may settle to the consumption of a liberal quantity of food, and obtain the necessary rest and quiet to enable her to make the best use of it. Moderate **exertion**, as browsing in a field, is advantageous to animals that are to be retained as dairy stock from year to year, for it keeps the limbs and the general constitution in a sound and healthy condition, and checks the tendency to run to fat, which cows acquire if constantly tied up. An immediate reduction in the quantity of milk follows any excess of exertion; this may occur through cows being startled and running frantically from the great gad-fly, *Tabanus bovinus*, and the little grey horse-fly, cleg, or small rain-breeze fly, *Hæmatopota pluvialis*, which appears in July;[1] it occurs also when they are in season ("a-bulling"); also if they are hunted by dogs, or even driven a long distance to pasture, especially if not permitted to go at the slow pace natural to a cow. More food is needed in these circumstances to make good the extra waste of the system, and all this requires to be deducted from what would have gone, under more settled conditions, to the formation of milk. The milk secreted is also inferior in quality, being poor in heat producers, especially butter-fat, and more liable to spoil in keeping or in the manufacture of its products. This is supposed to arise from the presence of an alkaloid which appears in the systems of animals that are excited or overheated—as in a fit of bad temper, or after being hard driven.

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[1] "Cattle on hot summer days are driven almost frantic by flies, thin-skinned young animals suffering more torment from their attacks than older ones. The Americans call this season of the year 'fly-time,' and as galloping madly over sun-baked pastures is not good for horses' feet, and there is nothing like peace and quiet for cows, it is best in fly-time to keep such animals in their stalls and sheds by day, and to turn them out only at night, when the horse-flies cease from troubling and the gad-flies are at rest. The plague of flies is worse in wooded districts and least in pastures near the sea, where the delicate Channel Islands cow may, in fly-time, be seen in Sussex tethered during the day."

The amount of milk given by a cow in the morning as compared with that in the evening (twelve hours elapsing in each case after the previous milking) varies with varying conditions. When cows lie out all night, and when day and night are mild, there is usually more milk in the evening than in the morning. When the nights are cold this disproportion is more marked; but should the nights be warm and comfortable, the days too hot and the cows unsettled, there might be a greater yield of milk in the morning. In moderate weather cows feed more by day than by night, and the result is immediately seen in improved milk production.

Under the conditions in which the **milk trials of the British Dairy Farmers' Association** are conducted, the evening is usually less in quantity but richer in quality than the morning yield, yet F. J. Lloyd has shown that in nearly all the breeds the total weight of fat in the morning closely approaches the total weight in the evening milk:—

Breeds.	Morning.			Evening.		
	1904.	1903.	1900.	1904.	1903.	1900.
Shorthorns . . .	·85	·91	·82	·89	1·00	·87
Jerseys	·87	·88	·75	·95	·83	·82
Guernseys . . .	·77	·66	·79	·70	·61	·76
Red Polls . . .	·78	·72	·72	·73	·68	·77
Kerries	·74	·72	·57	·66	·67	·54
Crosses, etc. . . .	·99	·83	·87	1·05	·86	·81

A cow pasture is better undulating than flat, provided the banks are not so steep as to cause accidents. It is a mistake to have pasture all thoroughly drained as if it were arable land; unless, indeed, it be arable land soured by stagnant water. It ought to be dry enough for cows to walk over the surface without breaking the sod and poaching it; but the hollows should be left moist enough to encourage the growth of food plants and grasses different from those that occupy dry land. These moist parts, in conjunction with other land, provide variety of food during the whole grass-season, and are particularly serviceable in a very hot summer, and at all times in autumn. Deep drains—now (1920) made possible even on heavy clay by the introduction of a successful mechanical draining-machine—are better than open surface-drains, where the land is good enough to warrant the expense of their construction. Large open ditches, especially with steep banks, are most objectionable in cow pastures, as there is always the danger among horned cattle of their being pushed or horned (Scotch—"dunched") into them.

The water supply is of premier importance. A shortage of water is seen immediately in diminished flow of milk. The water must be pure as well as abundant, for when contaminated by decaying organic matter, more particularly if this be of animal origin, the milk and its products do not keep well, and are liable to be injured by objectionable flavours and smells. A pure running stream, with a hard bottom and gradually sloping sides, is the best watering-place; but where drainage or river water is not plentiful, rain water should be safely stored in ponds or in underground tanks in times of rain against the dry season, and in such a way as to preserve its purity. A stagnant pool in which cows can walk and stand is most undesirable. Their solid and liquid excrements are dropped into it, and it soon becomes filthy. Cows are fond of standing in water in hot weather, to keep cool and to avoid flies; but the habit is not only injurious, inducing rheumatism if animals go in while heated by running, but it also involves waste of feeding time, which results in loss of produce.

Natural herbage from good old pasture, being an assemblage of the best perennial grasses, nutritious weedy herbage, and leguminous plants (clover, vetches, etc.), yields the finest quality of dairy produce; grass forced by high manuring or by irrigation is watery and immature; and when that or "seeds" grass is used alone, perhaps because there are fewer varieties of plants represented in such cases, there may be a difficulty in the manipulation of the products, more especially cheese. Young, or recently sown-out grass possesses one special advantage over old pasture, in springing earlier in the season, and it is good in conjunction with old pasture for encouraging the flow of milk. There are many upland grasses and plants, forming the food of mountain sheep, that must not be considered inferior for dairying; for light hardy cows often do well on wild-looking pasture in hilly districts, if a wide area be given, so that they may have ample choice of food—say, between 4 and 5 acres of pasture for each, with the aftermath of 2 acres of meadow cut annually for hay. The meadow should produce a little over 2 tons of winter fodder, or sufficient for a small cow of 8 or 9 cwts. live-weight, without roots or any artificial food, till after calving-time in spring. Subsequently each cow requires a moderate allowance of mixed meal and cake to keep up the flow of milk until the grass grows sufficiently to support her.

Of weeds that give a taste and smell to milk or butter, species of *Allium* are perhaps the worst and most common, besides being very difficult to be got rid of, viz., broad-leaved garlic (ramsons), *A. ursinum*, and round garlic (crow allium), *A. vineale*. Garlic mustard (sauce alone), *Alliaria officinalis*, with a small white flower, several other varieties of wild mustard, and also camomile, *Anthemis*, and ivy, *Hedera*, give a taste to milk. As most of the objectionable weeds grow in the shelter of fences, the injury may be minimised by frequently cutting weeds found in such places. The roots of water-hemlock or cowbane are poisonous, but they are not very accessible, and, moreover, the plant is not a common one in pasture. Buttercups, *Ranunculus* sp. are thought by some to give a rich golden tint to butter, and by others to produce an acrid taste in milk and its products. Most probably both ideas are wrong, although the first was at one time so prevalent that the familiar name of "John Buttercup" was given to the dairyman. In May and June, the buttercup season, when cows go on good pasture, grass-butter is naturally yellow, even when buttercups are not present. The change to the yellow colour is rapid at this season, forming a marked contrast to the pale "house-butter" of winter and spring. Cows grazing do not to any great extent eat the flower-stalks and heads of *Ranunculus*. Its leaves taken up with grass or other pasture plants act as a relish in a cow's food, though cases of poisoning have been traced to the consumption of the herbage of acrid species in too great quantity. Buttercups are said to be an indication of good soil: though it is true that good old pastures always include them, they appear abundantly in both bad and good pasture. The fact is in a great measure to be accounted for by animals leaving them —as it is possible for them to do while browsing—through a preference for grass and other herbage. As a rule, the quality of land is not indicated so much by the presence or absence of weeds as by their size and habit of growth; for instance, a well-developed thistle, *Carduus*, or cowslip, *Primula veris*, does not grow on poor land; only small and inferior specimens, though often in great abundance, are to be seen there.

Extent of Dairy Land.—Three acres of good grass are sufficient to provide for the keep of each cow during both summer and winter; rather more than an acre could be cut for hay, and the remainder grazed along with the aftermath of the hay land. About one-tenth of an acre of roots is at times made to replace a portion of the grass area. If, however, roots are given without concentrated food in autumn, before cows go dry, more milk is produced; but the cows are thus reduced in condition and rendered more difficult to winter. There is danger during spring of milk-fever, if roots are provided along with a full supply of hay, should the latter be of fine quality. The remark is equally applicable to any additional food that would induce the cow to thrive rapidly.

The average annual return of a well-managed dairy of good Shorthorn-cross cows should be about 550 gallons of milk per cow under the treatment described, with the addition of some artificial food in spring. Good Ayrshires on such land are not behind them in milking power. The ordinary Ayrshire on poorer land should give at least 450 gallons. Pedigree Shorthorns do not, as a class, even taking only milking strains, milk so heavily as their crosses and non-pedigree, though often well-bred relations, such as are usually found in English dairies in the country districts.

When the "soiling" system and higher feeding and farming generally are adopted, the average annual individual yield of milk may be raised by 150 gallons or more per cow, which should repay the extra labour if conditions necessary for such a system be present.

AVERAGE MILK SOLIDS: COWS OF DIFFERENT BREEDS. (Vieth.)

Breed.	Total Solids.			Fat.			Solids not Fat.		
	Maximum. Per cent.	Minimum. Per cent.	Average. Per cent.	Maximum. Per cent.	Minimum. Per cent.	Average. Per cent.	Maximum. Per cent.	Minimum. Per cent.	Average. Per cent.
Dairy Shorthorn .	18·7	10·2	12·90	10·2	1·3	4·03	10·6	7·6	8·87
Pedigree ,, .	16·8	10·5	12·86	7·5	1·9	4·03	9·8	7·6	8·83
Jersey . . .	19·9	11·0	14·89	9·8	2·0	5·66	10·4	8·1	9·23
Kerry . . .	18·6	10·6	13·70	10·5	1·8	4·72	10·6	4·9	8·98
Red Polled . .	16·2	9·7	13·22	6·6	2·5	4·34	10·2	7·1	8·88
Sussex . . .	17·4	11·5	14·18	7·6	2·9	4·87	10·3	8·4	9·31
Montgomery .	16·1	10·2	12·61	6·5	1·4	3·59	10·0	7·9	9·02
Welsh . . .	17·6	11·9	14·15	8·3	3·0	4·91	9·6	8·9	9·24

COMPOSITION OF MILK OF DIFFERENT BREEDS OF CATTLE.
(New Jersey State Agric. Exp. Station.)

Breed.	Total Solids.	Fat.	Milk-sugar.	Protein.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Ayrshire	12·70	3·68	4·84	3·48	0·69
Guernsey	14·48	5·02	4·80	3·92	0·75
Holstein	12·12	3·51	4·69	3·28	0·64
Jersey	14·34	4·78	4·85	3·96	0·75
Shorthorn	12·45	3·65	4·80	3·27	0·73

Bonnema gives for North Dutch or Friesian cows the following averages:—

Total solids.	Fat.	Sugar.	Protein.	Ash.	Solids not Fat.
11·5	3·0	4·3	3·5	0·7	8·5

The quantity and quality of the milk produced morning and evening during the years 1910 and 1919 (except in the few cases indicated), by the picked specimens of the most prominent milking breeds at the **Show of the British Dairy Farmers'**

MILKING TRIALS, B.D.F.A.—QUANTITY AND QUALITY OF MILK.

Breed.	Year.	No. of Animals.	Average Weight of Milk.		Total Weight of Milk.	Percentage Composition of Milk.					
						Fat.		Solids not Fat.		Total Solids.	
			Morning.	Evening.		Morning	Evening.	Morning.	Evening.	Morning.	Evening.
Shorthorns, Pedigree	1910	11	26·0	24·0	50·0	3·77	4·25	9·08	9·03	12·85	13·28
,, 3 and 4 years	1919	5	20·1	18·0	38·1	3·41	3·80	9·23	9·08	12·64	12·88
,, 5 years and over	1919	15	24·1	21·8	45·9	3·61	4·09	9·15	8·98	12·76	13·07
Shorthorns, Pedigree Heifers	1910	12	16·6	15·2	31·8	3·22	3·74	9·42	9·29	12·64	13·03
	1919	5	14·7	12·5	27·2	3·25	3·99	9·34	9·22	12·59	13·21
Shorthorns, Non-Pedigree Cows	1910	16	27·0	24·7	51·7	3·60	4·08	8·97	8·94	12·57	13·02
	1919	11	23·4	20·4	43·8	4·20	4·48	8·98	9·19	13·18	13·67
Shorthorns, Non-Pedigree Heifers	1910	11	16·6	16·0	32·6	3·31	3·72	9·33	9·24	12·64	12·96
	1919	6	20·1	16·3	36·4	3·98	3·55	9·25	9·16	13·23	12·71
Lincolnshire Red Cows	1910	8	24·1	21·5	45·6	3·60	4·00	9·03	8·96	12·63	12·91
	1919	6	25·6	22·3	47·9	3·27	3·96	9·21	8·96	12·48	12·92
Lincolnshire Red Heifers	1911	6	16·8	15·5	32·3	3·28	3·70	9·32	9·33	12·60	13·03
	1919	6	16·8	14·4	31·2	3·89	4·06	9·19	9·19	13·08	13·25
Jerseys	1910	19	18·6	15·9	34·5	5·15	5·66	9·17	9·08	14·32	14·74
	1919	24	16·3	14·3	30·6	4·71	5·72	9·27	9·09	13·98	14·81
Guernseys	1910	3	17·4	14·6	32·0	4·11	4·94	9·26	9·12	13·37	14·06
	1919	11	17·6	15·4	33·0	4·89	5·48	9·32	9·16	14·21	14·64
Red Poll Cows	1910	7	22·3	19·1	41·4	3·75	4·14	9·21	9·14	12·96	13·28
	1919	18	23·4	20·5	43·9	3·54	3·86	9·01	8·94	12·55	12·80
Red Poll Heifers	1910	7	17·2	15·6	32·8	3·56	4·12	9·50	9·39	13·06	13·51
	1919	5	19·2	18·3	37·5	3·09	3·95	9·28	9·11	12·37	13·06
Ayrshire Cows	1910	2	18·2	19·3	38·1	3·31	3·68	8·64	8·47	11·95	12·15
	1913	4	25·3	22·5	47·8	4·15	4·34	9·57	9·27	13·72	13·61
Devon Cows	1919	5	20·5	16·7	37·2	4·28	4·39	9·42	9·28	13·7	13·67
South Devon Cows	1910	7	26·2	24·9	51·1	3·44	3·88	9·25	9·04	12·69	12·92
	1915	3	22·2	18·4	40·6	3·17	3·60	9·29	9·06	12·46	12·66
Kerry Cows	1910	3	19·9	19·2	39·1	4·04	4·81	9·06	8·86	13·10	13·67
	1919	5	16·7	15·9	32·6	3·70	4·40	9·03	9·06	12·73	13·46
Dexters	1915	2	15·0	13·5	28·5	3·61	3·81	9·20	9·13	12·81	12·94
	1919	8	11·2	9·9	21·1	4·23	4·79	9·26	9·15	13·49	13·94
British Holstein Cows	1914	6	21·6	18·8	40·4	3·18	3·59	8·99	8·96	12·17	12·55
	1915	7	26·0	23·8	49·8	2·80	3·28	8·91	8·90	11·71	12·18
British Friesian Cows	1919	4	25·3	22·0	47·3	3·16	3·31	8·79	8·83	11·95	12·14

AVERAGE POINTS GAINED IN THE MILKING TRIALS EACH YEAR SINCE 1907.

Year.	Pedigree Shorthorn.	Pedigree Shorthorn Heifers.	Non-Pedigree Shorthorns.	Non-Pedigree Shorthorn Heifers.	Lincolnshire Red Shorthorns.	Lincolnshire Red Heifers.	Jerseys.	Guernseys.	Red Poll Cows.	Red Poll Heifers.	Ayrshires.	Dexters.	Kerries.	South Devons.	British Holsteins.
1908	99·5	...	103·6	...	95·7	...	82·3	80·7	74·1	...	62·6	68·8	74·3	...	...
1909	97·5	...	108·4	...	101·7	...	88·6	73·3	86·4	...	...	...	70·2	93·7	...
1910	109·5	...	109·4	...	99·4	...	90·5	77·9	95·5	...	74·6	...	89·1	107·2	...
1911	89·0	61·4	112·2	76·5	103·5	65·9	91·9	88·8	80·2	63·7	54·3	...	67·0	104·1	...
1912	98·0	40·3	124·4	79·4	95·5	67·3	94·5	71·0	96·3	75·9	79·6	...	93·3	110·6	...
1913	95·2	63·2	117·1	75·2	95·7	69·0	90·4	77·3	95·5	68·8	107·6	...	68·3	103·9	...
1914	106·5	62·4	106·9	73·6	96·3	67·7	89·8	85·5	127·6	65·5	...	...	...	108·5	80·7
1915	103·5	65·5	118·5	75·7	94·9	57·9	76·5	82·6	89·0	66·0	...	61·3	...	76·0	92·3
1919	95·2	59·6	95·0	89·2	98·4	68·3	80·3	84·9	88·8	78·0	...	...	69·6	...	83·1

THE HIGHEST POINTS GAINED EACH YEAR SINCE 1907.

Year.	Pedigree Shorthorn.	Pedigree Shorthorn Heifers.	Non-Pedigree Shorthorns.	Non-Pedigree Shorthorn Heifers.	Lincolnshire Red Shorthorns.	Lincolnshire Red Heifers.	Jerseys.	Guernseys.	Red Poll Cows.	Red Poll Heifers.	Ayrshires.	Dexters.	Kerries.	South Devons.	British Holsteins.
1908	139·2	74·0	133·0	88·7	115·9	...	100·7	94·1	93·6	72·4	82·1	...	104·3	...	...
1909	128·9	88·4	142·7	89·0	144·4	...	129·2	84·7	108·8	74·5	...	...	77·4	120·9	...
1910	136·7	85·7	138·5	85·1	124·2	66·2	111·6	82·5	120·0	79·6	87·7	...	100·3	135·6	...
1911	153·3	76·7	143·0	108·8	133·5	81·1	115·4	88·8	120·3	70·9	75·7	...	92·9	112·7	...
1912	125·6	57·7	169·5	106·7	130·4	89·1	117·9	85·0	122·7	90·8	90·9	...	102·8	144·8	...
1913	127·6	83·6	158·0	102·1	114·8	81·2	123·1	93·8	120·5	81·2	130·2	...	93·7	115·7	...
1914	144·8	98·1	136·9	97·6	105·5	77·2	112·2	99·7	144·9	98·1	...	...	...	133·8	103·6
1915	125·8	79·1	149·5	101·7	111·2	80·2	104·5	96·7	107·0	82·1	...	68·0	...	99·2	116·3
1919	136·4	69·0	117·8	118·8	133·6	85·1	99·4	118·8	135·9	96·2	...	66·6	101·3	...	117·1

Association, held early in October of each year, are shown on page 314, reproduced from the report of the milking trials of 1919 by F. J. Lloyd in vol. xxxii. of the Association's *Journal.*

The milking trials are held under the following conditions:—

(1) One point for every pound of milk, taking the average of two days' yield; (2) twenty points for every pound of butter-fat produced, as calculated by analysis; (3) four points for every pound of solids other than fat, similarly calculated; (4) one point for every ten days since calving after the first forty days, with a maximum allowance of 14 points. Deductions are also made of 10 points each time the milk falls below 3 per cent. of fat, or below 8·5 per cent. of other solids, below which no prize could be awarded.

Subjoined is a list of the original standards of points for the different breeds, established in 1901, which were in force for four years; and of the present standards, which took their place in 1905:—

	Points. 1901-4.	Points. 1905 and later.		Points. 1901-4.	Points. 1905 and later.
Shorthorns, Pedigree	90	85	Guernseys . . .	90	85
Shorthorns, Non-Pedigree . .	120	110	Red Polls . . .	90	90
Jerseys . . .	95	95	Ayrshires . . .	100	90
			Kerries . . .	75	75

The **following table**, from the official report on the **British Dairy Farmers' Milking Trials**, covers seven years. Column 1 shows the number of cows that competed; column 2, the

	Shorthorns.			Non-Pedigree Shorthorns.			Jerseys.			Guernseys.			Red Polls.			Ayrshires.			Kerries.		
	No.	90 Standard.	80	No.	120 Standard.	110	No.	95 Standard.	85	No.	90 Standard.	80	No.	90 Standard.	80	No.	100 Standard.	90	No.	75 Standard.	65
1898 . .	9	0	2	23	3	7	18	2	11	9	2	6	5	2	3	..	.	..	9	4	5
1899 . .	10	3	7	14	4	6	20	4	7	6	0	2	7	3	4	4	1	4	8	3	7
1900 . .	10	2	5	16	5	6	25	2	6	10	3	6	6	3	4	..	..	..	12	1	4
1901 . .	6	1	5	12	6	7	24	5	7	11	0	4	4	3	4	4	0	2	7	4	5
1902 . .	10	3	4	24	8	10	30	3	10	2	0	0	7	2	5	3	0	0	10	3	4
1903 . .	7	1	5	16	4	10	18	7	11	6	0	1	7	1	5	..	..	..	4	2	4
1904 . .	6	1	3	16	1	5	14	6	8	7	1	1	7	3	4	1	0	0	10	6	7
Total 7 years	58	11	31	121	31	51	149	29	60	51	6	20	43	17	29	12	1	6	60	23	36
Percentage .	..	19	53	..	25	42	..	19	40	..	11	39	..	39	67	..	8	50	..	38	60

number that reached the fixed standard; column 3, the number (including those in column 2) which reached 10 per cent. below the standard; with percentages for each column.

Dairy Show Averages of Mature Cows, October 1921.—Taking only the animals entered in the old cow class, viz., those calved before 1916, the work of each breed averages as follows:—

Breed.	No. of Cows.	Days in Milk.	Yield of Milk per lb.	Butter-fat Percentage.	Points Obtained.	Standard for Breed.
Pedigree Shorthorn	21	39	49·8	3·83	100·87	100
Non-Pedigree Shorthorn	14	21	53·0	4·35	117·55	110
Lincoln Red	7	55	52·0	3·64	109·07	100
Jersey	18	102	28·8	5·09	76·18	95
Guernsey	8	77	35·8	4·85	92·92	85
Red Poll	10	101	37·0	4·41	83·01	100
Devon	8	44	44·8	4·95	107·85	90
South Devon	5	77	42·7	5·01	104·44	100
Ayrshire	2	39	47·6	4·93	106·72	90
Kerry	14	91	31·4	4·78	77·26	80
Dexter	5	139	20·4	4·88	57·89	75
British Friesian	10	72	61·6	4·26	133·60	110

In the **butter tests** conducted by the same Association, the prizes are awarded according to the following scale of points:—One point for every ounce of butter; one point for every completed ten days since calving, deducting the first forty days. Maximum allowance for period of lactation, 12 points. Fractions of ounces of butter, and incomplete periods of less than ten days, are worked out in decimals and added to the total points. In the case of cows obtaining the same number of points, the prize is awarded to the cow that has been the longest time in milk.

> "It is very unfortunate that so few owners give even **the milk records** of every cow and heifer in their herds. These owners find, as everyone must find, that some cows have not done well and so the record is only given of their very best cows; the names of the other cows of which no record is given are, however, often found in the catalogue of sales.
>
> "It is to be hoped that a time will come when all the owners of the best dairy herds will give *year by year* the milk and butter-fat records of all animals in their herds that have had a calf or a miscarriage or premature birth so long as those cattle remain in their herd. If this were done it would prevent the keeping back of service or the letting a cow go dry for a long period so that she might afterwards make a good year's record (a 1000-gallon cow, etc.), or win a prize at a show with a fine udder.
>
> "It is also to be hoped that in all first-class herds of pedigree dairy cattle, records may be kept and published in the birth sheets of all miscarriages or premature births; for the regular breeding and therefore the continuous record of the dam and grand dam is of great importance in the selection of a bull."

This is one of the rare cases in which legislative interference would prove beneficial.

MILKING TRIALS AT THE DAIRY SHOW, 21st October 1921.

Breed	Pedigree Dairy Shorthorn Cow calved before 1916.						Shorthorn Cow calved between August 1916 and August 1918.						Shorthorn Heifer calved after August 1918.			
Name and Owner	E. A. Smith's "Castlethorpe Seraphina."		Chivers's "Wild Queen 29th."		D. Aldridge's "Vain Lucy 5th."		D. Aldridge's "Merry Maid 5th."		J. Peel's "Watercrook Rose."		Capt. Wills's "Thornby Ringlet 3rd."		Abel Smith's "Longhills Melody."		Lt.-Col. Pryor's "Lady Barrington."	
Born	16 Nov. 1913.		8 Sept. 1912.		Feb. 1913.		May 1917.		Jan. 1917.		Sept. 1916.		Sept. 1918.		Feb. 1919.	
Days since calving	95		41		15		14		33		21		160		33	
	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.
Weight of milk, 1st day	34·5	28·5	32·9	26·2	30·7	24·4	30·2	28·2	30·0	24·1	29·8	22·6	19·6	16·7	17·5	14·7
,, ,, 2nd ,,	34·0	29·0	34·1	26·5	30·8	25·6	32·2	29·8	29·8	24·6	27·6	25·9	19·1	17·6	19·3	15·9
Average	34·2	28·7	33·5	26·3	30·7	25·0	31·2	29·0	29·9	24·3	28·7	24·2	19·3	17·1	18·4	15·3
Composition of milk:—																
Fat	3·00	3·51	3·92	4·36	4·72	4·82	3·28	4·79	3·43	4·30	3·33	4·27	3·64	3·96	4·36	3·82
Solids other than fat	8·96	8·81	8·92	8·98	9·46	9·16	9·32	9·07	8·77	8·80	9·05	9·17	9·04	9·38	9·32	9·26
Solids (Total)	11·96	12·32	12·84	13·34	14·18	13·92	12·60	13·86	12·20	13·10	12·38	13·44	12·68	13·34	13·68	13·08
Actual weight of fat, in lb.	1·05	1·01	1·31	1·15	1·45	1·20	1·03	1·38	1·03	1·05	·96	1·04				
Actual weights of solids other than fat, in lb.	3·06	2·53	3·00	2·36	2·90	2·29	2·92	2·63	2·62	2·14	2·60	2·22	·70	·675	·80	·585
Points:—																
For time since calving	5·5		·1		—		—		—		—		3·7		—	
For weight of milk	62·9		59·8		55·7		60·2		54·2		52·9		36·4		33·7	
For weight of fat	41·2		49·2		53·0		48·2		41·6		40·0		27·5		27·7	
For weight of solids other than fat	22·36		21·4		20·76		22·20		19·04		19·28		13·4		12·56	
Total	131·96		130·5		129·46		130·6		114·84		112·18		81·0		73·96	
Remarks	1st Prize *		2nd Prize		3rd Prize		1st Prize †		2nd Prize		3rd Prize		1st Prize		2nd Prize	

* Desborough Cup.

† Res. for Desborough Cup.

MILKING TRIALS AT THE DAIRY SHOW—(*Continued*).

Breed	NON-PEDIGREE SHORTHORN COW.				NON-PEDIGREE SHORTHORN HEIFER.		LINCOLN RED COW CALVED BEFORE AUGUST 1918.				LINCOLN RED HEIFER.		JERSEY COW CALVED BEFORE 1918.			
Name and Owner	Sir W. Hickling's "Golden Sovereign."		Nelson's "Lady Nelson."		Walter Wilson's "Lady Mary."		J. Evens's "Burton Fillingham."		J. Evens's "Burton Suttie 2nd."		S. Reading's "Langford Polly 9th."		Bruce Ward's "Marseillaise."		Col. Gisborne's "Dock Weed."	
Born Days since calving	1914. 94		1915. 16		Dec. 1918. —		April 1915. 35		May 1914. 115		Sept. 1918. —		Jan. 1917. 126		Mar. 1916. 160	
	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.
Weight of milk, 1st day	42 0	33·9	32·0	25·7	19·1	15·4	37·8	33·4	34·2	24·9	25·1	19·7	19·8	15·9	18·2	17·0
,, ,, 2nd day	47·6	30·7	31·8	26·9	19·3	17·5	39·7	33·3	36·9	25·5	24·8	19·8	17·3	16·2	17·8	15·8
Average	44·8	32·3	31·9	26·3	19·2	16·4	38·7	33·3	3·55	25·2	24·9	19·7	18·5	16·0	18·0	16·4
Composition of milk:—																
Fat	3·00	3·52	4·53	5·20	5·69	4·93	3·29	4·97	4·19	3·91	4·25	3·73	6·55	6·36	4·66	6·45
Solids other than fat	8·66	8·60	8·99	9·08	9·73	9·75	9·25	9·15	8·83	9·09	9·19	9·33	9·09	9·36	9·32	9·03
Solids (Total)	11·66	12·12	13·52	14·28	15·42	14·68	12·54	14·12	13·00	13·02	13·44	13·06	15·64	15·72	13·98	15·45
Actual weight of fat, in lb.	1·34	1·14	1·45	1·37	1·09	·81	1·65	1·48	1·48	·985	1·06	·73	1·21	1·02	·84	1·06
Actual weights of solids other than fat, in lb.	3 89	2·78	2·86	2·4	1·87	1·6	3·58	3·04	3·14	2·29	2·28	1·83	1·68	1·5	1·68	1·48
Points:—																
For time since calving	5·4		—		—		—		7·5		—		8·6		12·0	
For weight of milk	77·1		58·2		35·6		72·0		60·7		44·6		34·5		34·4	
For weight of fat	49·6		56·4		38·0		58·6		49·3		35·8		44·6		38·0	
For weight of solids other than fat	26·68		21·64		13·9		26·5		21·7		16·4		12·7		12·6	
Total	158·78		135·64		87·5		157·1		139·2		96·8		100·4		97·0	
Remarks	1st Prize *		2nd Prize		1st Prize		1st Prize †		2nd Prize		1st Prize		1st Prize		2nd Prize	

* Res. for Barham and Shirley Cups.

† Res. for Spencer Cup.

MILKING TRIALS AT THE DAIRY SHOW—(*Continued*).

Breed	Jersey Heifer.	Guernsey Cow calved before August 1916.				Guernsey Cow calved between Aug. '16 and Aug. '18.				Guernsey Heifer.		Red Poll Cow calved before August 1916.			
Name and Owner		Mrs Jervoise's "Lady's Maid" 2nd of "Ville du Roi."		Bainbridge's "Godolphin Pansy."		W. Trumper's "Damaris" of "Bigard 2nd."		J. Towler's "Ranunculus 32nd."		J. B. Body's "Lynchmere Rosy."		Sir A. Bowen's "Sudbourne Adela."		Pilkington's "Harefield Ruth."	
Born		April 1915.		Sept. 1907.		Jan. 1917.		Jan. 1917.		Aug. 1918.		May 1913.		Feb. 1916.	
Days since calving		22		51		13		135		160		112		49	
		Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.
Weight of milk, 1st day		31·0	25·5	26·0	21·1	21·0	16·3	15·1	13·2	16·3	12·6	28·4	21·4	24·3	20·5
" " 2nd day		31·6	27·2	26·6	22·6	20·8	15·8	17·1	13·6	15·8	11·5	27·5	23·0	22·1	18·7
Average		31·3	26·3	26·3	21·8	20·9	16·0	16·1	13·0	16·0	12·0	27·9	22·2	23·2	19·6
Composition of milk :—															
Fat		3·63	4·24	4·11	4·98	4·48	4·47	5·21	5·07	5·57	6·46	3·82	4·71	5·37	5·68
Solids other than fat		9·31	9·18	9·43	9·35	9·62	9·55	9·13	9·15	9·43	9·08	8·82	9·03	9·45	8·94
Solids (Total)		12·94	13·43	13·54	14·32	14·10	14·02	14·34	14·22	15·0	15·54	12·68	13·74	14·80	14·62
Actual weight of fat, in lb.		1·14	1·12	1·08	1·08	·94	·715	·84	·68	·89	·775	1·06	1·05	1·23	1·11
Actual weights of solids other than fat, in lb.		2·92	2·42	2·48	2·04	2·02	1·53	1·47	1·23	1·51	1·09	2·46	2·0	2·20	1·75
Points :—															
For time since calving		..		1·1		..		9·5		12·0		7·2		·9	
For weight of milk		57·6		48·1		36·9		29·5		28·0		50·1		42·8	
For weight of fat		45·2		48·2		33·1		30·4		33·3		42·2		46·8	
For weight of solids other than fat		21·3		18·1		14·2		10·8		10·4		17·8		15·8	
Total		124·1		115·5		84·2		80·2		83·7		117·3		106·3	
Remarks		1st Prize *		2nd Prize		1st Prize		2nd Prize		1st Prize		1st Prize		2nd Prize	

* Stagenhoe Cup.

MILKING TRIALS AT THE DAIRY SHOW—(*Continued*).

Breed	RED POLL COW CALVED BETWEEN AUG. '16 and AUG. '18.				RED POLL HEIFER.		FRIESIAN COW CALVED BEFORE AUGUST 1916.						FRIESIAN COW CALVED BETWEEN AUG. '16 and AUG. '18.			
Name and Owner	Lt.-Col. Elwes's "Kirton Fryer."		Felix Leach's "Meddler Mayflower."		Maj. Morrison's "Spalding Pearl."		Wallace's "Bladen Early."		J. Russel's "Felhampton Susan."		A. & J. Brown's "Hedges's Friesland Queen."		Holt Thomas's "Beccles Silver Queen."		Capt. Buxton's "Petygards Masseux."	
Born	Sept. 1917.		Mar. 1918.		Apr. 1919.		June 1914.		Oct. 1915.		Nov. 1913.		Feb. 1918.		Nov. 1916.	
Days since calving	29		46		68		14		104		19		58		30	
	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.
Weight of milk, 1st day	31·5	26·1	27·5	22·8	20·0	16·5	41·2	39·5	38·2	28·0	45·9	35·2	28·4	25·6	29·0	25·4
" " 2nd day	32·0	26·5	27·5	24·4	19·1	15·5	47·5	27·2	36·0	28·3	45·1	38·5	28·4	24·2	29·1	24·8
Average	31·7	26·3	27·5	23·6	19·5	16·0	44·33	33·3	37·1	28·1	45·5	36·8	28·4	24·9	29·0	25·1
Composition of milk:—																
Fat	4·08	4·99	4·97	5·79	4·47	3·96	4·41	4·54	5·23	4·29	3·84	4·10	3·88	4·92	4·25	3·81
Solids other than fat	9·40	9·01	9·35	9·47	9·25	8·80	8·85	8·82	8·51	8·55	8·20	8·18	8·76	8·60	9·11	8·89
Solids (Total)	13·48	14·00	14·32	15·26	13·72	12·76	13·26	13·06	13·74	12·84	12·04	12·28	12·64	13·52	13·36	12·70
Actual weight of fat, in lb.	1·30	1·31	1·37	1·37	·87	·635	1·95	1·51	1·94	1·21	1·75	1·51	1·10	1·25	1·23	·95
Actual weights of solids other than fat, in lb.	2·98	2·37	2·58	2·24	1·80	1·4	3·91	2·84	3·15	2·40	3·75	3·02	2·48	2·14	2·64	2·23
Points:—																
For time since calving	..		·6		2·8		..		6·4		..		1·8		..	
For weight of milk	58·0		51·1		35·5		77·6		65·2		88·2		53·3		54·1	
For weight of fat	52·2		54·8		30·1		69·2		63·0		65·20		47·0		43·6	
For weight of solids other than fat	21·4		19·3		12·8		27·0		22·2		26·88 20 deducted.		18·48		19·48	
Total	131·6		125·8		81·2		173·8		156·8		154·38		120·58		117·18	
Remarks	1st Prize		2nd Prize		1st Prize		1st Prize *		2nd Prize		3rd Prize		1st Prize		2nd Prize	

* Barham, Spencer, and Shirley Cups.

MILKING TRIALS AT THE DAIRY SHOW—(*Continued*).

Breed	FRIESIAN HEIFER.		KERRY COW.		KERRY HEIFER.		DEXTER COW.		DEXTER HEIFER.		SOUTH DEVON COW.		DEVON COW.		WELSH COW.	
Name and Owner	F. & T. Neame's "Macknade Errand."		J. H. Towler's "Wadlands Buttermilker."		J. W. Towler's "Rosebud of Carton."		A. King's "La Mancha Madeline."				W. H. Hunt's "Milkmaid 4th."		W. G. Busk's "Stratton Tottie 5th."			
Born	Nov. 1918.		1912.		Mar. 1919.		Mar. 1913.				May 1912.		Feb. 1912.			
Days since calving	13		58		59		160				146		19			
	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.	Mrn.	Evn.			Mrn.	Evn.	Mrn.	Evn.		
Weight of milk, 1st day	20·3	19·3	24·7	21·1	12·0	12·3	19·0	13·8			32·1	25·6	27·7	25·0		
" " 2nd day	20·7	17·6	26·7	21·5	13·9	12·6	17·9	15·4			31·2	28·6	29·4	24·5		
Average	20·5	18·4	25·7	21·3	12·9	12·4	18·4	14·6			31·6	27·1	28·5	24·7		
Composition of milk:—																
Fat	4·31	5·08	3·95	5·23	5·18	5·34	4·71	5·26			4·41	4·73	4·95	6·31		
Solids other than fat	9·31	8·88	8·85	8·69	9·48	9·22	8·61	8·62			8 93	8·93	9·21	9·25		
Solids (Total)	13·62	13·96	12·80	13·92	14·66	14·56	13·32	13·88			13·34	13·66	14·16	15·56		
Actual weight of fat, in lb.	·88	·94	1·02	1·11	·67	·66	·87	·765			1·39	1·28	1·42	1·56		
Actual weights of solids other than fat	1·91	1·63	2·28	1·85	1·21	1·14	1·58	1·26			2·82	2·42	2·64	2·28		
Points:—																
For time since calving	..		1·8		1·9		12·0				10·6		..			
For weight of milk	38·9		47·0		25·3		33·0				58·7		53·2			
For weight of fat	36·4		42·6		26·6		32·7				53·4		59·6			
For weight of solids other than fat	14·18		16·52		9·40		11·36				20·96		19·7			
Total	98·48		107·92		63·20		89·06				143·66		132·5			
Remarks	1st Prize		1st Prize[1]		1st Prize		1st Prize				1st Prize		1st Prize			

[1] Kerry and Dexter Cup.

Food Value of Milk.—The butter-fat in Jersey milk averages 5·4 per cent., that in good Shorthorn milk being 4 per cent., while the Government standard for milk when sold is 3 per cent.; and it is important to realise that as the butter-fat increases so also do the other solids (casein, albumen, and sugar), though not in the same proportion. The food value of milk increases as the butter-fat increases, and 100 lb. of Jersey milk, as compared with 100 lb. of Holstein milk, contains 2 lb. more of butter-fat and 1 lb. more of other solids.

In the following table the food or energy-value of milk is shown by the total starch value, and it should be noted that the food value of Jersey milk is practically 50 per cent. above that of the Government standard.

COMPOSITION OF MILK OF THREE COWS AS ASCERTAINED IN U.S.A.

Fat per cent.	Protein.	Sugar.	Total Starch Value.
3·0	2·68	4·6	14·03
4·0	3·08	4·85	16·93
5·5	3·65	4·92	20·94

The "**butter-ratio**," or the amount of milk required to produce 1 lb. of butter, has been ascertained for the milk of different breeds of cows, and Ernest Mathewes gives the butter-ratio for the various breeds in the following table:—

MILK REQUIRED TO MAKE ONE POUND OF BUTTER.[1]

Breed.	Ratio.	Gallons.
Red Poll	30·00	3
Welsh		
Shorthorn	27·50	$2\frac{3}{4}$
Lincoln Red		
Ayrshire		
South Devon	26·00	$2\frac{3}{5}$
Kerry		
Dexter		
Longhorn	22·5	$2\frac{1}{4}$
Guernsey	21·00	$2\frac{1}{10}$
Jersey	19·00	$1\frac{9}{10}$

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[1] See E. J. C. S.'s *Herd Book*, 1909.

A Year's Produce of Record Butter-fat Cows.[1]

Name of Cow.	Last Owner.	Milk.	Fat.
FRIESIANS.			
		lb.	lb
"Bella Pontiac," 46321 C	Thos. A. Barron, Brantford, Ontario	27,017·0	1,259·0
"Duchess Skylark Ormsby," 124514	John B. Irwin, Minneapolis, Minn.	27,761·7	1,205·09
"De Kol Plus Segis Dixie," 25787 C	D. Raymond, Vaudreuil, Que.	32,665·0	1,190·0
"Finderne Pride Johanna Rue," 121083	Bernhard Meyer, Finderne, N.J.	28,403·7	1,176·47
"Segis Pietertje Prospect," 221846	Carnation Stock Farm, Seattle, Wash.	37,381·4	1,158·95
	Average production	30,645·76	1,197·90
GUERNSEYS.			
"Countess Prue," 43785	F. L. Howes, Groton, Mass.	18,626·2	1,103·28
"Murne Cowan," 19597	O. C. Barber, Barberton, O.	24,008·0	1,098·18
"May Rilma," 22761	T. P. Crozier, Upland, Pa.	19,673·0	1,073·41
"Nella Jay 4th," 38233	T. W. and I. W. Roberts, Philadelphia, Pa.	20,709·9	1,019·25
"Langwater Nancy," 27943	A. T. Herd, New Hope, Pa.	18,783·5	1,011·66
	Average production	20,360·1	1,061·15
JERSEYS.			
"Plain Mary," 268206	Ayrdale Stock Farm, Bangor, Me.	15,256·0	1,040·08
"Vive la France," 319616	Pickard Brothers, Marion, Ore.	15,272·0	1,039·29
"Lady Silken Glow"	Pickard Brothers, Marion, Ore.	14,939·0	1,038·70
"Sophie's Agnes," 296759	Ayrdale Stock Farm, Bangor, Me.	16,212·0	1,000·07
"Sophie 19th of Hood Farm," 189748	C. I. Hood, Lowell, Mass.	17,557·0	999·10
	Average production	15,847·0	1,023·44
AYRSHIRES.			
"Lily of Willowmoor," 22269	J. W. Cliss, Redmond, Wash.	22,596·0	955·56
"Auchenbrain Brown Kate 4th," 27944	Penhurst Farms, Narberth, Pa.	23,022·0	917·60
"Garclaugh May Mischief," 27944	Penhurst Farms, Narberth, Pa.	25,329·0	894·91
"Auchenbrain Yellow Kate 3rd," 36910	Penhurst Farms, Narberth, Pa.	21,123·0	888·33
"Jean Armour 3rd"	W. P. Schanck, Avon, N.Y.	21,938·0	859·65
	Average production	22,801·6	903·21

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[1] Compiled by Professor W. W. Zapp, Dairy Husbandry Department, Illinois, U.S.A.

"If the price of milk is estimated at eightpence per gallon the butter made from the milks of the various breeds, eliminating the value of the separated milk, will work out as follows":—

	Per lb.	
	s.	d.
Red Poll and Welsh	2	0
Shorthorn, Lincoln Red, and Ayrshire	1	10
South Devon, Kerry, and Dexter	1	8¾
Longhorn	1	6
Guernsey	1	4¾
Jersey	1	3¼

The butter tests in this country are held at the Shows, usually lasting for a period of twenty-four hours. Taking the results of these tests for ten years, from 1907 to 1916, Jerseys won 112 prizes against 53 prizes awarded to all other breeds.

The world's record of 25,213·4 lb. of milk and 888·48 lb. butter in 305 days for a four-year-old cow of the Friesian breed, from the Colantha-Johanna strain, is held by Elmer E. Heg & Sons, East Stanwood, Washington State. This cow, "Tyee Hiske Fayne," calved at 4 years, 2 months, 15 days on 30th January 1921, began test 2nd February, was bred 13th May 1921, finished test 4th December 1921, and calved again 15th February, or 12 months 17 days after last calving.

CHAPTER XVI

DAIRYING—PASTURE AND FOOD—*continued*

Data for Calculating the Amount of a Cow's Food—Plan of Arrangements for Feeding 100 Cows on 300 Acres—Winter Dairying—House-Feeding for a Town Milk Trade—Examples of Edinburgh and Leith Dairies—Analyses of Morning's and Forenoon's Milk—Tuberculosis in Cow's Milk—Butter-making without a Churn.

DATA for calculating the amount of a cow's food in a mixed system of summer pasturing and "soiling."—As in the grazing example, 3 acres go to one cow, but the grain grown is sold, if it be not thought advisable to use it as concentrated food, which in the other case had to be bought. Each cow requires, besides summer pasture, 2 tons of straw and hay for fodder, amounting to 25 lb.[1] per day during the six winter months, besides concentrated bought food such as cake and meal given in spring. In addition, the following roots and forage crops may be provided at the various seasons throughout the year:—

(1) One-third of a cwt. of roots per day for four winter months (eighteen weeks), given mostly when cows are dry = 2 tons 2 cwts. per cow, or 1 acre for ten cows—swedes, 15-ton crop; mangels, 27 tons—average 21 tons per acre; (2) one-half cwt. of rye per day for three weeks in April = 10 cwts. per cow in twenty days, or 1 acre for ten cows, with a 5-ton crop; (3) one-quarter cwt. per day of crimson clover, rape, vetches, etc., for twenty-one weeks in summer = 37 cwts., nearly, per cow, or roughly five cows to 1 acre, with a 9-ton crop; (4) one-half cwt. cabbages per day for ten weeks in autumn = 35 cwts. per cow, or fifteen cows per acre, with a 26¼-ton crop.

Plan by which 100 Cows can be Fed on 300 Acres.

100 acres of arable land, 4-course rotation, and catch crops.
150 ,, permanent pasture grass.
50 ,, ,, grass-meadow, cut for hay.

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[1] In *Experiments on Ensilage* (1886), Harrison & Sons, p. 28, Sir J. B. Lawes, Bart., and Dr (Sir Henry) Gilbert, give 25 lb. of "dry substances" of food as the daily amount for an ordinary cow.

Annual Crops on the Arable Land.

(1) 25 Acres. Wheat or oats, followed by 20 acres winter catch crops and 5 acres winter fallow.	(4) 25 Acres. "Seeds" cut for hay, 20 acres latter-math pastured, and 5 acres cut for forage.
(2) 25 Acres. Roots and forage crops following catch crops, etc.	(3) 25 Acres. Oats, as a "nurse" for grass and clover "seeds."

Areas in Acres of Root and Forage Crops, including Catch Crops:— 10 roots, 6⅔ cabbages, 10 rye, 20 vetches, clover and rape: Total, 46⅔ acres.

Winter Catch Crops and Fallow after a Grain Crop.	**Root, Green, and Forage Crops in the Regular Rotation.**
5 ac. cleaning for mangels to be sown next spring.	10 ac. mangels and swedes.
10 ,, trifolium and vetches.	6⅔ ,, cabbages.
10 ,, rye.	8⅓ ,, vetches and rape.
—	——
20 ,, Total catch crops.	25 ,, Rotation root and forage crops.

The above totals make 45 acres of root and forage crops, including catch crops, but 46⅔ acres are required, and can be made up by taking a second cut from 5 acres of "seeds," which is an equivalent of 1⅔ acres of vetches. A second cut of "seeds" should give 3 tons of green food per acre, or one-third of a good vetch crop.

Winter dairying, excepting only the special object of milk-supply, is little practised in this country. One of the great causes which have led to the ever-increasing importation of butter into England is the reluctance of dairy-farmers to change their system of management in accordance with the change in the tastes and requirements of consumers. Fresh butter is needed not only during summer but throughout the year, in large and uniform quantities. For two conspicuous reasons the British butter-makers are unable to compete with foreigners—1*st*, a steady supply is not to be had all the year round, because the great bulk of home-made butter is produced during the months when grass is abundant, and when it is supposed that butter can be made at a minimum cost; and 2*nd*, there is no means of securing those large uniform quantities that alone can find a place in the great market centres. British dealers found a difficulty in securing from the Continent a supply sufficient to meet the increase in the demand for butter; and after an effort had been made to awaken the farmers of this country to the fact that a large extension of winter dairying was the only means left to save them from a still keener competition, attention was turned to Australasia.

BRITISH IMPORTS OF BUTTER FROM 1896 TO 1922.

Year ended 30th June.	British.					Foreign.									Grand Total.
	Australia.	Canada.	New Zealand.	South Africa.	Total British.	Argentina.	Denmark.	France.	Holland.	Norway.	Russia.	Sweden.	Other Countries.	Total Foreign.	
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1896	8,260	2,100	2,589	...	12,949	689	61,836	...	...	...	7,110	...	...	131,249	146,198
1897	9,978	4,557	3.576	...	18,111	541	63,466	...	...	...	9,078	...	...	138,800	156,911
1898	7,837	5,962	3,933	...	17,732	867	69,051	...	...	...	9,358	...	...	141,426	159,158
1899	9,764	8,151	4,528	...	22,443	950	74,977	...	...	...	7,704	...	...	142,193	164,636
1900	17,653	11,932	7,949	...	37.534	1,361	71,708	...	...	...	7,588	...	...	133,957	171,491
1901	15,556	7,532	8,912	...	32,000	1,052	75,664	...	...	...	13,016	...	...	143,459	175,459
1902	7,449	11,491	8,295	...	27,235	2,529	82,757	...	...	...	22,408	...	...	160,672	187,907
1903	1,053	13,238	9,575	...	23,866	4,190	88,903	...	...	...	22,180	...	...	176,320	200,186
1904	19,655	9,879	15,836	...	45.370	4,435	88,151	...	...	...	24,849	...	...	173,573	218,943
1905	23,368	12,847	15,667	...	51,882	3,575	83,520	...	...	...	20,159	...	...	152,015	203,897
1906	26,950	15,145	15,177	...	57,272	2,665	81,261	...	...	...	25,327	...	...	158,221	215,493
1911	44,395	776	15,852	...	61,023	932	88,379	14,665	6,272	1,295	30,201	18,671	1,352	161,767	222,790
1912	33,677	2,997	16,183	...	52,857	2,603	80,398	8.333	5,337	1,615	30,757	17,123	1,172	147.338	200,195
1913	26,414	...	13,416	...	39,830	4,400	82,546	13,167	6,584	1,211	35,194	16,000	378	159,480	199,310
1914	26,076	41	16,609	...	42,726	2,358	88,935	11,328	7,572	778	41,056	17,996	665	170,708	213,434
1915	21,848	443	17,920	...	40,211	4.314	82,258	17,651	7,452	2,580	26,537	7,993	1,394	150,179	190,390
1916	6,363	1,188	18,371	...	25,922	5,791	54,662	12,748	640	1,087	41,723	2,898	2,880	122,429	148,351
1917	28,012	5,360	16,639	1,836	51,847	5.041	50,445	4.565	4,411	6	...	2	7.374	71,844	123,691
1918	27,067	1,266	17,841	766	46,940	13,199	9,237	1,448	1 557	...	...	...	6,543	31,984	78,924
1919	16,342	3,415	18,179	845	38,781	16,646	2,856	47	82	...	...	...	12,343	31,974	70,755
1920	15,754	2,424	12,586	...	30,764	5,369	34.591	201	2,289	414	812	...	6,308	49,984	80,748
1921	36,214	995	28,085	592	65,886	19,423	47,580	265	5,435	...	501	...	1,123	74,327	140,213
1922	51,688	1,646	43,184	1,369	97,887	16,821	67,313	38	1,604	76	4,632[1]	155	165	90,894	188,781

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[1] Finland.

In 1891,[1] Andrew Clement, of Glasgow, then the largest wholesale dealer in dairy produce in Scotland, acting in the interests of the trade, paid a visit of investigation to Australia and New Zealand with the object of establishing business connections, and met with great success.

It is interesting to refer to the 1892 Report of Wilson, the Victorian Government dairy expert, and to realise the rate at which the early fresh butter export trade grew :—

> "In 1889-90, 400 tons of butter were exported, averaging 9d. per lb. ; in 1890-91, the quantity exported was 1000 tons, averaging 10½d. per lb. ; while for this season the quantity exported will be 2143 tons, the average price being 1s. per lb."

The result of the growth of this new industry, together with the phenomenal development in the making of margarine of good quality, is that British farmers have lost much of the slender footing they had in the butter market, and in spite of the increased possibilities in butter-making brought about by the instruction in dairying provided by County Councils throughout the length and breadth of the country, the quality of the home-made article is on the whole very inferior and disappointing. This is in great measure the result of following the objectionable practice of churning once a week in the hot weather with cream in a decomposing condition, in place of every second or third day with properly ripened cream—a method by which the finest butter in the world can be made off our home pastures. The farmer loses such trade connection as he can form with his produce of irregular quality at the end of each grass season, and he has to begin afresh in spring to establish himself against the foreigner, who keeps up a steady supply at all seasons of the year. Winter dairying, no doubt, entails more trouble, and involves the employment of a larger amount of capital, as well as a greater annual expenditure than the old system of summer dairying, but the annual total produce can be largely increased. The system lends itself chiefly to the encouragement of the natural tendency of the public to consume daily a large quantity of full milk.

Sir Richard Barter, St Ann's Hill, Cork, a pioneer in this system of dairying,—

> "Found from carefully kept records that cows calving in December and January give the largest return of milk—for say ten months in milk—as there comes on a second flush of milk when cows get the grass at the end of April and May, and they yield during the summer nearly as well as if they calved in March."

Associated with the increased supply of winter produce, **co-operation** for manufacturing and marketing purposes is in the great majority of small holdings an absolute necessity. The co-operative creamery system proved to be a great success in the south and west of Ireland, and at the same time an immense advantage to small holders who, acting individually, are powerless to secure a market connection.

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[1] In 1891, the amount of foreign dairy-produce imported was valued at over £14,000,000. See also Appendix B., page 794.

"Soiling" of Milch Cows.

The "**soiling**" **farm system**, which will maintain herds of dairy cows entirely on arable land for the year round, has a promising future in this country, in spite of the widespread belief of its impracticability among dairy farmers whose experience has been one-sided. The system makes possible a high level of intensive production, and under more perfect organisation of labour and a wider knowledge of modern practical and scientific methods will encourage the economical handling of crops. It is also a means by which it will be possible to retain in cultivation much of the land now under the plough, which would inevitably go back to grass if it were attempted to retain it as in the past for cereal growing and root production for fattening animals. The development of the system was the salvation of Denmark when she was on the verge of bankruptcy, and it has been practised as a paying proposition in America and other dairying countries.

Experiments extending over two years, carried out at **Harper Adams** Agricultural College,[1] produced, in spite of war prices and war difficulties, encouraging results. For the summer period from 9th May till 30th September green fodder crops were used, and included the four British cereal grains, maize, peas, beans, and vetches. As these first crops were gradually removed to supply a regular succession of food, the whole of the land was planted with cabbages for a second crop, which lasted from 1st October till the middle of February and was fed with pea and oat hay. Rye was remarkable in producing milk from which exceptionally fine, firm butter was made, and crushed oats gave better results than purchased meal.

The third period from Mid-February till 8th May was supplied with mangels and pea and oat hay. By this means 13 cows were fed in 1918 on 15 acres of arable land, supplemented by an average amount of 4 lb. of cake and meal per head per day throughout the year.

Fodder was eaten with great avidity when it was young and succulent; though it was liable to produce scour during wet weather. Pea and oat hay, or pea haulms, proved to be a better corrective than meadow hay or cake. Relishes, as sorrel, parsnip-tops, carrot-tops, and spinach, were thought to give good results fed in small quantities in the bulky fodder crops. Rock-salt supplied in the manger reduced the disagreeable odours from urine in hot weather. Eighty lb. of green fodder per day, which may be all cabbages, is the minimum amount necessary during the winter months to maintain the maximum flow of milk, if fed with 14 lb. of pea and oat hay and 4 lb. of cake.

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[1] *Second Report*, by J. C. Brown, Vice-Principal (Bennion Horne & Co., Newport, Salop (price 6d.), 1919).

During 1918 the cows were only allowed out for half an hour twice daily for water and exercise. They remained quite healthy and bred freely without ill effects to the calves.

"The yield of milk for the year commencing 9th May was · · · an average of 652 gallons per cow, and 548 gallons per acre." The cows were ordinary types of dairy Shorthorns past their best, and but for a spell of drought they would have given better results, as the yield per cow was 735 gallons in the following year.

It is believed that a 600-gallon cow kept on the "soiling" system will give 100 gallons more milk than when kept in the ordinary way. The falling off in yield of the latter between 8th September and 18th January was 59 per cent. as against 38 per cent. in "soiled" cows. "The whole cost of production of the bulky fodder, including all charges, was only 5·07d. per gallon: labour—man and horse—cost approximately 5·47d. per gallon, less than one-third of the total cost of production, which is only slightly greater than the amount which was expended on concentrated food."

House-Feeding as practised in the Production of Milk for a Town Milk Trade.

When good non-pedigree milking Shorthorn cows are kept at all seasons in the house, and fed to the highest degree possible, the yield per cow can be made double that obtained under the natural system—the produce can be raised from 550 to 1100 gallons. This system is not compatible with calving-down the cows a second year. Animals approaching their prime, viz., after the third or fourth calf, are selected, which—after milking for nine or ten months, when the yield of milk becomes naturally reduced, so that it would not pay to keep them longer—go directly to the butcher, without being put dry. This is a severe drain upon the supply of our best milch cattle, and it has unquestionably, since the development of the milk trade in towns, tended to reduce the numbers of good cattle in this country. It is one of the fundamental and insidiously growing causes which have led up to the shortage of cows in milk and in calf, announced in the Government Returns made in 1920.

In a typical Leith dairy of 100 cows, yielding an average of 3¼ gallons of milk each daily during summer, and 3 gallons in winter, **the daily food of an average cow** (which weighed 1120 lb., cost £22, and six weeks after calving yielded 43 lb. of milk daily, namely 18 lb. morning, 11 lb. forenoon, and 14 lb. afternoon) was specially tested towards the end of March 1906, and found to be as follows:—

Food and Cost per Ton.	Food at 4 A.M.	Food at 9 A.M.	Food at 2 P.M.	Total Food.	Cost per Day.	
	Lb.	Lb.	Lb.	Lb.	s.	d.
Draff, 22s.	7	Mash at blood heat 13	Mash at blood heat 13	33	0	2¾
Treacle, 105s.	...	1½	1½	3	0	1¾
Pease-meal, 150s.	...	2	2	4	0	3
Compound Cakes, 160s	...	2	2	4	0	3¼
Water (warm)	...	2	2	4	...	
Turnips, 17s.	33	9	33	75	0	6¾
Potatoes, 25s.	...	12	...	12	0	1¾
Hay, 40s.	7	...	7	14	0	3
					1	10¼

COMPARATIVE STATISTICS.

Food Costs per Cow per Day in March 1906 and in October 1917 (War Time).

	Cost per lb.		Lb per Cow on basis of 74 Cows.	Cost per Cow.			Per Professor Wallace, *Farm Live Stock of Great Britain*, 1907, p. 307.		
	Lb.	Pence.		Pence and Decimals.	Stg.		Total Food.	Cost per Day.	
					s.	d.	Lb.	s.	d.
Draff	3,752	·268	50·7	13·5876	1	1½	33	0	2¾
Yellow Turnips	5,040	·107	68·1	7·2867		7¼	75	0	6¾
Potatoes	...	...	...	...		...	12	0	1¾
Wheat Straw	550	·321	7·6	2·4396		2½	...		...
Oat Straw	672	·428	9·1	3·8948		4	...		...
Hay	...	...	...	...		...	14	0	3
Treacle	196	2·893	2·7	7·8111		7¾	3	0	1¾
Linseed Meal	144	2·357	1·9	4·4783		4½	...		...
Pease-meal	...	...	...	...		...	4	0	3
Barley Meal	132	2·143	1·8	3·8574		4	...		...
Compound Dairy Meal	136	1·982	1·8	3·5676		3½	...		...
Bran	224	1·513	3·0	4·539		4½	...		...
Mill Seeds	112	·964	1·5	1·446		1½	...		...
Compound Cakes	...	...	...	...		...	4	0	3¼
Water	...	...	...	...		...	4		...
				52·9081	4	5	...	1	10¼

The charges per cow per week worked out, for (*a*) food, about 13s.; (*b*) attendance, 2s.; (*c*) depreciation, 4s. (being a loss of £8 on a cow milking nine months); or a grand total of 19s.

The narrowness of the **margin of profit** to the cowfeeder in pre-war times may be realised, when a yield of 3 gallons per day, sold at 10d. per gallon, realised only 17s. 6d. per week for milk disposed of wholesale. When sold at 1s. per gallon, the profit of 2s. was too small to support a successful business, so that a larger yield than 3 gallons per day or a larger price than 10d. or 1s. per gallon was a necessity. Probably the best solution of the difficulty, taking all interests into consideration, would be a **Government Order** prohibiting the keeping of cows in populous areas within city boundaries, where they require to be confined under artificial conditions, and necessitating their transfer to the wholesome surroundings and cheaper and more natural food-supply in the country, where milk of the finest quality can be produced at the cheapest rate without sacrificing the lives of the cows before they have passed the maximum period of production. This arrangement would ultimately lead to all milk being chilled and delivered cold to consumers, and to more of the work of the dairy being done within the ordinary hours of day labour.

It ought to be one of the first duties of the Ministry of Agriculture in England and Board of Agriculture for Scotland, to find for the town milk producers (who did a great national service at ruinous loss during the war) suburban farms—to place them back on the land. It would be a grave injustice and a great national loss to scrap the experience in cattle management that they possess.

COST OF PRODUCING MILK ON 13TH OCTOBER 1917

Being Details of a One Day's Test supervised by the Author in SAM. J. ROBERTSON'S DAIRY of 74 Cows at Damhead Farm, Gorgie, Midlothian.

Labour—

2 byremen, 1 vanman, and 1 carter, at 6s. 6d. per day	£1	6	0
4 women milking and washing, at 2s. 3d. per day	0	9	0
1 man and 1 lad helping, etc., at 4s. per day	0	8	0
	£2	3	0

Cost per cow (74), 7d. Cost per gallon (199), 2½d.

Oncost—

Rent, taxes, etc., 1 day	£0	5	6
Cost of van, horse feed, etc.	0	10	0
Supervision and work (self)	0	12	6
Depreciation at £12 per cow in 8 months	3	14	0
Interest on capital of £2300, at 5 per cent.	0	6	4
	£5	8	4

Cost per cow (74), 1s. 5½d. Cost per gallon (199), 6½d.

Test on 74 Cows (Cost of Food).

Food—

1. Draff, 33½ cwts., at £2, 10s. per ton	£4	3	9
2. Yellow turnips with shaws, 2 tons 5 cwts. at £1 per ton	2	5	0
3. Wheat straw (bedding, 5 cwts.) at £3 per ton	0	15	0
4. Oat straw fodder, 6 cwts. at £4 per ton	1	4	0
5. Treacle (West Indian), 196 lb. at £27 per ton	2	7	3
6. Linseed meal, 95 per cent., 144 lb. at £22 per ton	1	8	3
7. Barley meal, 132 lb. at £20 per ton	1	3	7
8. Compound dairy meal, 136 lb. at £18, 10s. per ton	1	2	6
9. Bran, 2 bags 112 lb. each, at £14, 2s. 6d. per ton	1	8	6
10. Mill seeds, 1 bag 112 lb., at £9 per ton	0	9	0
	£16	6	10

Cost per cow (74), 4s. 5d. Cost per gallon (199), 1s. 7¾d.

Produce—

Milk, morning	116½ gallons.
„ mid-day	40½ „
„ evening	42 „
Total	199

Manure: deducted—

Total weight of manure for one day, 4 tons at 6s. per ton.

Return per cow (74), 3¾d. Return per gallon (199), 1¼d.

Draff consists chiefly of brewers' grains. Distillery grains are worth a few shillings a ton more, but being heavy to digest and more liable to spoil by fermentation, are safe to use only two days a week.

Treacle in some form is indispensable as a preventive of stomach staggers resulting from over-feeding—the most common ailment of dairy cows under forcing conditions. **Nutrimol**, which consists of germ oilcake meal, is in high favour with cowfeeders, but **molascuit**, though not so well known, and not such a complete food by itself, contains molasses in a form in which it can be easily transported and handled.

Pease-meal made from Canadian peas is in greater favour than bean-meal, as it is said to be less liable to induce hoven. Indian peas have too often impurities that make them hot or biting to the taste, and the fear of poisoning by prussic acid also militates against their use. Most dairy **compound cakes** have an attractive appearance, and are believed to give good results, but they are generally too dear. This trade advantage is maintained only because purchasers have not the technical knowledge necessary to enable them to buy the ingredients separately at market value and mix them at home, and they are not infrequently further imposed upon by very finely ground, indigestible, and worthless woody fibre, under the name of cellulose, being added to keep down the price per ton. The chief source is the outer husk of oats got from oat-meal millers and ground to an impalpable powder.

Yellow turnips with their leaves attached are preferred during the early part of the season, to be followed as Christmas approaches by stored swedes.

Potatoes are not used except when the price is abnormally low. They are given, unwashed, in limited quantities once a day, as they are more indigestible than turnips and liable to induce hoven; and moreover, like mangels, they produce pale milk, which looks poor in quality and unattractive to the consumer.

The best first-crop **hay** is preferred if its price be not excessive. When dear, a proportion of second-crop rye-grass or oat **straw** is substituted. French wheat straw used to be employed for litter in pre-war times.

Morning **feeding**, occupying two men, begins at 4 A.M. with a short allowance of draff without water or other food stuffs, followed at 5.30 by a basketful of turnips, and at six o'clock by a foddering of hay. **Milking** is carried on from 4 to 6 by four women, and two men "muck" the byres at the same time. The second feeding and second milking begins at 9 A.M. A warm mash is given first, followed by a few turnips for each animal at 9.30 and potatoes about fifteen minutes later; one man being then sufficient for the mucking, another milker is freed. The third feeding and cleaning out of the byre begins with the final milking at two o'clock. The mash is followed by turnips about three o'clock, and hay about four o'clock. At seven o'clock the man in charge looks in to see that all is quiet, and the doors are then closed for the night.

In summer the turnips, straw, treacle, and part of the brewers' grains are replaced by grass from sewage meadows or by green forage—frequently Italian rye-grass forced by dressings of nitrate of soda. The cost of this should be rather under its equivalent of winter food.

The **yield per cow** while in milk varied before the war in different dairies according to the types of cows selected, the amount of forced feeding, and the temperature of the byre, from 2½ to 4 gallons per day = 690 up to 1105 gallons in nine months. As each cow is replaced at the end of that time by a "green" or newly calved cow, the average of milk given annually per stall is raised from 1095 to 1460 gallons. The temperature of the byre ranges between 60° and 70°, and the largest yields are produced at the highest temperatures.

The decidedly unnatural method of treatment which involves the imprisonment of the cows in comfortable quarters, but deprived of exercise, has led to much discussion as to its influence on the quality of the milk produced.

In the spring of 1900 the late **Dr Stevenson Macadam** threw much light on the question, by a careful and elaborate **series of tests** for the Edinburgh and Leith Dairyman's Association, of average samples of the milk of 123 cows from a total of 681 cows housed in sixteen dairy byres belonging to the great system of milk production in the Scottish Metropolitan centre. The mixed milk samples ranged in composition in 100 parts by weight as follows :—

	Morning Milkings.	Forenoon Milkings.
Total solids,	from 12·51 to 11·19	From 14·08 to 12·53
Fat of solids,	„ 3·72 to 2·16	„ 4·96 to 3·49
Solids not fat,	„ 9·45 to 8·79	„ 9·76 to 8·64
Ash in solids,	„ ·84 to ·71	„ ·85 to ·71

Dr Macadam employed the now obsolete "maceration" process, and to bring his results into line with those of the two more accurate and recent processes invariably employed, *i.e.*, of Adams and Werner-Schmid, it would be necessary to add from 0·2 to 0·3 to each result in the foregoing table.

Several tests with smaller numbers of cows indicated that the afternoon or third milking in the day, although much richer than the early morning's milk, was not quite up to the product of the forenoon milking.

The following table, giving the mean monthly average of morning and evening milk for seventeen years, will show the average differences. The mean intervals of milking were 10·8 and 13·2 hours.

COMPOSITION OF MORNING AND EVENING MILK (1897-1913) ACCORDING TO HENRY DROOP RICHMOND.

Month.	Morning Milk.				Evening Milk.			
	Specific Gravity.	Total Solids.	Fat.	Solids not Fat.	Specific Gravity.	Total Solids.	Fat.	Solids not Fat
January .	1·0324	12·58	3·62	8·96	1·0322	12·92	3·94	8·93
February .	1·0325	12·52	3·56	8·96	1·0322	12·85	3·89	8·96
March .	1·0324	12·46	3·51	8·95	1·0320	12·81	3·85	8·96
April .	1·0323	12·40	3·48	8·92	1·0321	12·73	3·83	8·90
May . .	1·0326	12·27	3·33	8·94	1·0320	12·75	3·80	8·95
June . .	1·0325	12·21	3·29	8·92	1·0320	12·65	3·76	8·89
July . .	1·0320	12·24	3·46	8·78	1·0314	12·56	3·80	8·76
August .	1·0318	12·31	3·55	8·76	1·0313	12·70	3·95	8·75
September	1·0320	12·49	3·63	8·86	1·0316	12·89	4·05	8·84
October .	1·0322	12·67	3·72	8·95	1·0319	13·04	4·11	8·93
November	1·0323	12·77	3·80	8·97	1·0320	13·09	4·14	8·95
December.	1·0324	12·72	3·75	8·97	1·0321	13·01	4·05	8·96
Average .	1·0323	12·47	3·56	8·91	1·0319	12·83	3·93	8·90

The tests have not produced any evidence to break down the rule that the quality of milk can only be immediately affected to the extent of a small fraction of a percentage of cream by the character of the food given. If the sloppy forcing food has any important influence upon the quality of the milk, it must be through its influence in the first instance on the constitution of the animal. The striking difference between the proportions of solids in the morning's milk when contrasted with those of the two later milkings, is to be accounted for by the great length of time which elapses before the morning milking.

The following is an example of regulations, which are amended from time to time, for the feeding of farmers' cows under contract with the **Copenhagen Milk Supply Company**[1]—one of the best managed organisations for the supply of the best and purest tubercle-free milk in the world:—

I. The food of the cows must be quite fresh and in a good state of preservation. It must be free of all faults which might impart an abnormal flavour or colour to the milk. **II.** In the summer the cows must be fed in the open on clover and grass. In case of necessity dry fodder or cut corn (green) may be given them, but on the field: it is not allowed to stall feed them in summer. **III.** The farmer must in good time come to an understanding with the company as to the nature of the food which he proposes to give during the winter. **IV.** He must with regard to the winter feeding conform to the following rules:—(*a*) *Roots.*—Carrots and mangolds may be given in the proportion of ½ bushel per cow, but on condition that at least 5½ lb. of corn, bran, and oilcake are given as well. Cows producing nursery milk may only have ¼ of a bushel; turnips, swedes, and leaves of turnips and swedes are forbidden. (*b*) *Oilcakes.*—Rape-seed cake and sunflower cake are the only cakes to be used, in the proportion of 1 lb. of each, but mixed with at least 5½ lb. of corn and bran. Cows that give nursery milk must not have any oilcake. (*c*) It is also forbidden to use brewers' grains and all similar refuse from distilleries.

In winter, while infants' milk is being milked, cows stand in a well-ventilated, well-lit, spotlessly clean milking chamber. The milk is instantaneously cooled from about 90° F. to 30° F. by being drawn into a bucket with a double bottom charged with a freezing mixture.

In summer the cows are milked in the field. When it rains they are sheltered in small tents to prevent the rain washing impurities from the skin into the milk. The milk is sealed in bottles, dated and guaranteed to keep sweet for twenty-four hours after delivery, even if not kept very cool.

Wolff's Feeding Standard for milch cows of 1000 lb. live-weight was fixed some years before the end of last century at 24 lb. of dry matter, containing 2·5 lb. of protein, 12·5 lb. of carbohydrates, and about 4 per cent. of fat; yielding an albuminoid ratio of 1 : 5·38. The round figures 1 : 5·4 were for a time pretty generally accepted as the standard both in Europe and America. In 1904, **Professor F. W. Woll**, of Wisconsin Experiment Station, struck an average of 128 rations used in dairies in different parts of the United States, and his results are now accepted as the[1]

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[1] *Copenhagen Milk Supply Company*, 1878, by G. Borch, M.D., and D. A. Stewart Macgregor.

AMERICAN STANDARD RATION FOR DAIRY COWS OF 1000 LB. LIVE-WEIGHT.

(*Wisconsin Bulletin*, 38, p. 46.)

Average.	Dry Matter.	Digestible Matter.			Nutritive Ratio.
		Protein.	Carbo-hydrates.	Fat.	
For 128 herds .	Lb. 24·31	Lb. 2·15	Lb. 13·27	Lb. ·74	1 : 6·9

This distinctly wider nutritive ratio makes it possible to consume a larger proportion of home-grown produce. It is thus more economical during a period of highly priced feeding cakes like that of 1905-7 and since the war.

Tuberculosis[2] is a specific disease due to the *Bacillus tuberculosis*, which produces consumption in human beings. It is well known to attack cattle, horses, pigs, and poultry. Goats and sheep have been generally accredited with immunity, but it is now too prevalent among Long-wool rams confined under cover and forced for public sales in an unnatural and unwholesome atmosphere. Even the naturally hardy Scotch Blackface Mountain sheep is liable to it, if shut up and highly fed in a house at home, and covered with tarpaulin in the modern showyard. Wild animals are rarely affected, and, when the disease occurs, it most probably originates by contact with civilisation. Two familiar instances are the Chartley Park white cattle, and wild rabbits at times when they get excessively numerous, especially during certain seasons when they confine themselves much to their burrows. Once introduced, the close atmosphere of the burrow favours its dissemination. Open air, sunlight, and free ventilation are the best safeguards of stock, as of the human species. Excluding animals that are kept out of doors, and calves, about 30 per cent. of all cattle slaughtered in this country are reported to be tuberculous. The disease is rare in animals under one year old, and it is very exceptional to find it in calves under a month old. Of cattle on the open camp in Argentina, only about one per thousand suffers from a taint of tuberculosis. An unexplained exception to the general rule is the prevalence of tuberculosis in the Zebu cattle in the south-west of the Island of Madagascar, where they are kept entirely in the open air. In town dairies where cows are crowded together in dark, ill-ventilated buildings, and simultaneously milked and fed for the butcher, within twelve months 50 up to 75 per cent. are not infrequently affected. **Professor Nocard**, the great French authority, who did much to advance our knowledge of the disease, said that in his experience "15 to 25 per cent. of cows in the country are tuberculous, but that not one calf in ten thousand is diseased." **Professor Sir John M'Fadyean, M.B., B.Sc., C.M**, in a brochure, *Tuberculosis as regards Heredity; its Causation and Elimination from Infected Herds* (John Murray, 1911), estimates, in absence of conclusive results of investigations into an admittedly difficult question, that something less than 1 per cent. of calves have been found by *post-mortem* examination to be tuberculous at birth. He also expresses doubt if any cases of congenital tuberculosis among calves are attributable to the bull. (See Appendix J.) The milk of an affected cow may not perceptibly decrease in quantity, but it is lowered in quality. The responsible bacillus thrives best in darkness, at temperatures from 80° to 105° F. Affected cattle showing no external signs of disease may be a source of infection to others with which they come in contact. The seats of disease in cattle are the various lymphatic glands of the body, the lung, the intestine, and the udder. Next to the other glands in the chest cavity, the lung is by far the commonest seat of the disease, besides being the most likely to act as a means for communicating it. Next in order comes the intestine, and finally the udder. About 3 per cent. of tuberculous cows have a lesion in the udder, and it is only when a lesion discharges into the flow of milk that danger from it may be seriously anticipated. The bacillus may even then be removed by the use of the centrifugal cream separator, in the slime of which the organisms accumulate. **Actinomycosis** (see p. 281) in the udder may be, for want of proper examination, mistaken for tuberculosis.

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[1] See also the beginning of Chapter XIV., p. 289.

[2] Valuable information relating to Tuberculosis will be found in:—(1) *The Journal of the Royal Agricultural Society of England*, 1898, vol. ix. part ii., No. 34, p. 323; (2) A Leaflet on "Tuberculosis in Dairy Stock," issued by the same Society, free on application to the Secretary, 16 Bedford Square, London, W.C.; (3) *The Report of the Royal Commission on Tuberculosis*, 1898 (C. 8824), and Minutes of evidence taken before the same (C. 8.831) (official); (4) *The Transactions of the British Congress on Tuberculosis*, 1901, vol. iv., Veterinary Section, published by W. Clowes & Sons, 23 Cockspur Street, London, S.W.

Animals with pulmonary tuberculosis have a persistent cough. The temperature is slightly raised, and they become weak and emaciated as the ailment develops. In the advanced stage of intestinal tubercle there is diarrhœa associated with emaciation, and, when the disease is located in the udder, there is a hard, swollen, painless condition of the affected quarter (usually a posterior quarter), and the lymphatic glands above are increased in size and are hard, though painless. The milk from a tuberculous udder is at first normal in quantity and quality, but it soon becomes thin and watery, though the quantity may not be much diminished. Tuberculosis is not now believed to be hereditary; although a tendency to take it is readily communicated by parent to offspring. In a considerable area of the Fens of Lincoln and Cambridge shires it is acknowledged that locally induced tuberculosis is practically unknown in either medical or veterinary practice, but actinomycosis is very prevalent among cattle, and cancer is extraordinarily prevalent among human beings. Too little is yet known about these insidious diseases to permit of inferences being drawn from the bald facts.

Contributing causes to the admission of the organism in sufficient numbers to establish a colony and produce the disease are: (*a*) Hereditary weakness of constitution, very often due to intense consanguineous breeding—as in the case of the Chartley Park wild white cattle, and Pedigree Shorthorn cattle generally, but notably in the in-bred Bates' Duchesses, which have practically become extinct in the pure line of descent; (*b*) dark and insanitary byres; (*c*) bad ventilation; and (*d*) very specially the inhalation by healthy cows of dust containing dried saliva or excrement, or the breath of those who have contracted the disease in their lungs. The calves of tuberculous cows can be brought up quite healthy under the system propounded by Professor Bang of Copenhagen early in the last quarter of the nineteenth century, if kept away from their own mothers in an atmosphere free from tuberculous contamination and reared on sound foster-mothers, or even if fed on the milk of tuberculous cows, if it be first raised to a temperature of 160° F. Sunlight and low temperatures are inimical to the bacillus, hence the success, in spite of a certain amount of exaggeration, of the open-air treatment of human patients in the sunny high mountainous districts. All "piners" should be immediately removed from the herd and destroyed.

Although only partial success has been achieved after frequent failures of the **Vaccine** or **Serum treatment** for the prevention or cure of tuberculosis, hints have been given by members of the staff of the Pasteur Institute in Paris that progress is being made in that direction. Experiments have been conducted in which several vaccinated calves periodically treated have remained sound at the end of thirty-four months' contact with tuberculous cows in a stable in which calves that had not received treatment succumbed. Indications distinctly point to ultimate success. (See Appendix J, "Tuberculosis.")

The test by Koch's tuberculin, although not hitherto infallible, has proved useful as a means by which to detect the disease, and enable breeders to eliminate it from their stock. Animals that react are drafted from the herd and kept apart until they can be got rid of, in most cases without serious pecuniary loss; no animals which react should be admitted.

From the following brief **History of two Dairies** of pedigree Ayrshire cows that belonged to James R. W. Wallace, of Hikwa, Thornhill, Dumfriesshire, it will be seen how cattle were, and still can be, reared in healthy surroundings without taint of tuberculosis, and how the disease can be effectually eliminated, without appreciable loss, by Bang's method. The following substantial prices received at the displenishing sales (in each case before the great post-war boom in pedigree stock occurred), also show how breeders who were the purchasers appreciate animals that have been normally reared and are guaranteed free from tuberculosis.

The **Auchenbrack and Kilmark** dairy of sixty-seven cows, which at auction on 23rd May, 1912, averaged £32, 17s. 4d., was established by the late Samuel Wallace, father of the present writer, of Wallace Hall, Glencairn, about the middle of the nineteenth century by heifers selected by himself, for utility purposes in a cheese dairy, at the summer fairs in Ayrshire, long before pedigree records were thought of. In the last owner's time no trouble was spared, yet without going to extravagant prices, to procure bulls from sound herds and the best milking strains. With two exceptions the cows were all bred on the farm, a high lying one with an elevation of about 730 feet above sea-level. They had not been fed on turnips, and only received a minimum amount of bean meal and maize meal for a few weeks at calving time, March and April, to carry them over while on dry (hay) fodder, till grass came. Young cattle were all wintered out after the first year as calves, until they came into the dairy as three-year-old calving queys. Tuberculosis had never occurred in the herd, which had also been for many years free from contagious abortion. Such an upbringing prepared them for any country or climate suitable for European cattle. They were noted as good pioneers in Sweden, the United States, and South Africa, a good many being exported as heifers; they gave a good account of themselves in milk record tests and show yard competitions.

The **Auchenbainzie** dairy of forty cows, which brought at auction on 14th March 1918 an average of £104, 15s. 6d., was a creation of comparatively recent date. It consisted to a large extent of the old Auchenbrack blood, but a number of cows belonging to the previous occupier remained behind and some of them would not pass the tuberculin test. Reacters were segregated and got quit of at the end of the season, and in three or four years no trace remained of the disease. On one occasion a valuable young bull of superior milking strain, secured to graze with the stock two-year-old heifers, failed to pass the test, nevertheless he was let loose among them, used for the grazing season, and disposed of in autumn. As was anticipated he left no trace of tuberculosis in his progeny or among the heifers he had grazed with and bulled.

"Tuberculin is described as a simple glycerine extract of the cultures of the bacilli of tuberculosis, cultures which have been sterilised at a temperature of about 230° to destroy the organisms," and concentrated by evaporation. It thus contains the dead and often macerated bacilli. "It is not a serum but a fluid containing the toxin or poison given off by the tubercle bacillus." "That it has failed as a preventive of consumption or as a cure is recognised, but thousands of experiments have shown that it is most reliable as a diagnostic of bovine tuberculosis."

"When the test is to be applied, it must be performed under aseptic conditions, and 60 or 70 minims of tuberculin injected into the subcutaneous tissue of the neck or shoulder." It should be fresh, and of a quality like that prepared at the Jenner Institute of Preventive Medicine.

The **results** obtained by the **ordinary veterinary practitioner** following his own method or that "relative" standard recommended by Cobbett and Stanley Griffith, members of the Royal Commission on Tuberculosis, led to uncertainty in results, widespread dissatisfaction, and heavy pecuniary loss. These consequences have been mainly due to neglect to record the normal condition and variation in temperature of each animal under treatment "with that degree of accuracy essential for the estimation of the value of the results obtained in such a delicate test." It has been thus possible to exaggerate on the one hand or to minimise on the other, the rise of temperature from the injection of tuberculin, as indicated by the three accompanying figures, and arrive at a wrong diagnosis with either sound or unsound animals. The rough-and-ready positive test of a rise of 1·5° F. above the normal taken once, is not enough. An **accurate and successful method** of making the tuberculin test, evolved by the late Sir G. Sims Woodhead K.B.E., M.D. (Edin.), and P. C. Varrier-Jones, M.A., M.R.C.V.S., of Cambridge University, involves the use of their thermometer for registering the *continuous* temperatures of living beings.[1] The temperature charts (Fig. 25, on page 342), show the records of three animals, (1) a normal cow; (2) a tuberculous cow; and (3) a tuberculous calf.

"It was found that during the greater part of the twenty-four hours the temperature of the healthy cow runs up or down between 101° F. and 102° F. It is highest during the day (102·3° F. to 102·5° F.) usually between 16 and 18 o'clock (4 to 6 P.M.), whilst the animal is moving about and feeding. During the night, whilst the animal is at rest, the temperature falls steadily as low as 101° F. or 100·7° F., reaching the lowest point at from 3 to 6 o'clock in the early morning. (Rarely this lowest point may be reached earlier—midnight to 1 o'clock.) The temperature begins to rise at from 4 to 6.30, *i.e.*, as soon as the animal gets to its feet, is milked, or takes warm food.

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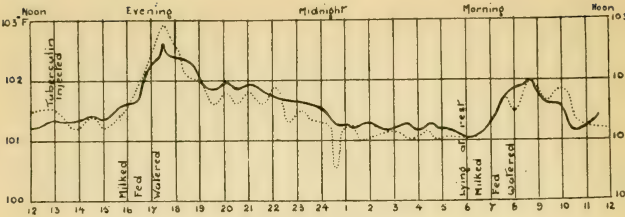
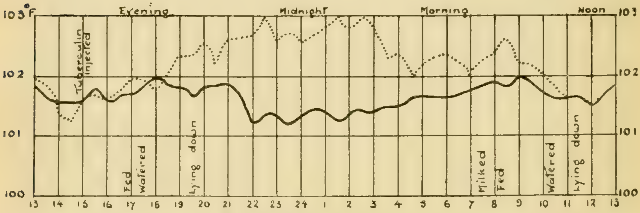
[1] Described in the *Journal of Comparative Pathology and Therapeutics*, Cambridge, and in the *Live Stock Journal* of 13th February 1920, p. 155.



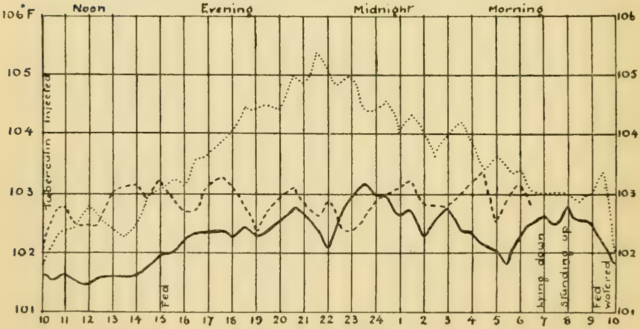
Normal Cow.

— = Pre-Tuberculin curve ······ = Tuberculin curve



Tuberculous Cow.

— = Pretuberculin curve ······ = post-Tuberculin curve.



Tuberculous Calf.

— = Pre-Tuberculin curve ······ = post-Tuberculin curve
----- = late post-Tuberculin curve.

FIG. 25.—TUBERCULIN TEST CHARTS.

Prepared by the late Sir G. Sims Woodhead.

Watering half an hour later brings about a slight fall (0·2° F. to 0·5° F.), but as digestion goes on the temperature rises gradually, but slowly, until the next milking time, when there is a more rapid rise until 16 to 18 o'clock as on the previous day, again followed by a fall on watering."

The figures and explanations on the charts confirm and amplify the foregoing statement; for example, the temperature of the healthy calf is from 0·3° F. to 0·5° F. higher than that of the healthy cow, and the variations, although following a similar course, are greater in the calf. It is essential for success that the cow be kept quiet, in a normal condition, and watered and fed regularly, because while "exercise and excitement raise the temperature of a normal animal, they exert a still more marked effect on the temperature of a tuberculous animal."

It is all-important that the temperature of each animal be taken continuously for twenty-four hours before the injection of tuberculin and for twenty-four hours after it. As in the case of normal human temperatures the variation in cattle temperatures ranges round a diurnal difference of about 1° F. The tuberculous cow diagram, Fig. 25, shows a range of from 101·3° at midnight to 102·3° at 8 A.M. The tuberculin injection was followed for 7·5 hours by a steady rise, with the marked exception of a sudden fall after watering. A "plateau" (level) temperature . . . of about 103°, a low maximum, was maintained for four hours, "after which it fell rapidly and 'brokenly' until the morning and feeding time, when after a slight rise there was a steep and long fall following watering." The diagram of a tuberculous calf, Fig. 25, follows the same general course as that of the tuberculous cow above mentioned, but exaggerated—both indicate a characteristic febrile reaction. The control temperature was high and very irregular. The temperature after inoculation had a more uniform rise to a much higher point, 105·4°, followed by rapid and more zigzagged descent.

"The initial rise is steady and continuous, reaching a maximum from seven and a half, to eleven and a half hours after injection. The fall is slower and takes place in waves more or less pronounced, reaching the normal level within the next twelve to eighteen hours."

The apparatus for taking the internal temperature in the vagina of the female and the rectum of the bull by means of "a 'robust' electric resistance platinum wire in a silver tube used as a thermometer, combined with a galvanometer and a Darwin's thread recorder," can be safely used, by a qualified veterinary surgeon, on the farm where cattle are normally situated. Every animal in a herd should be tested annually, and all that react immediately segregated and eliminated at the earliest opportunity to secure the minimum of loss. The test is not reliable when a cow is in the last stage of the disease, which can usually be diagnosed by sight, or when the test has been previously used within a short period. When disease is present a month is allowed to pass before a second test can be trusted to respond normally. It is consequently a fraudulent practice secretly to inoculate animals a few days before an official test.

Dr Calmette, Sub-Director of the Pasteur Institute in Paris, appointed by the French Academy of Medicine to investigate tuberculosis, states in his report (1922) "that the tuberculous bacillus of the bovine type differs greatly from the human type, not only in form but in growth and in virulence; and bovine type bacilli are rarely met with in tuberculin lesions in human beings:" and adds "that the way to solve the problem is not by regulations and wholesale slaughter of affected animals, but by more hygienic cowsheds, less overcrowding, and the isolation of acute cases."

The Netherlands (Dutch) Government have, since 1st January 1905, offered full **compensation** for cows reported by the farmers to be tuberculous, and the regulations, being optional, work well. The flesh is sold, and little loss is sustained by Government. In this country when a carcase is condemned in the public interest, even that of an animal which when alive showed no symptom of disease, the loss falls upon the owner, who may have bought it only the day before in the open market. This seems hardly up to the usual standard of British justice, but loss is met by an arrangement for mutual insurance at auction marts.

Butter-making without a Churn.—A remarkable characteristic came under observation about 1885 in the case of a cow, the property of William Lind, Belford. She was got by a pure-bred Shorthorn bull, probably out of an Ayrshire cow, and was then eleven years old. During the first two years the cow was in profit there was nothing unusual about the milk, but after the birth of her third calf it became specially rich and the cream was easily made into butter by stirring it with a thirl-stick for not more than five minutes. For seven years no churn was used, and in warm weather the cream sometimes formed butter without stirring.

A sample of the milk was sent to Edinburgh for microscopical examination in 1890, but nothing abnormal was detected, except that the fat globules were remarkably large. When the animal was at full profit the yield amounted to 28 quarts of milk in the day. The heifer calves of this cow, three in number, by Shorthorn bulls, have been reared, and two have inherited their mother's peculiarity.

CHAPTER XVII

DAIRYING—COWS AND THEIR MANAGEMENT

Treatment of Dairy Cows—Milking—Manipulation of the Udder—Milking Machines—The Universal—Period of Lactation—Guénon's Escutcheon Theory—De-sexed Cows—How to put a Cow Dry—Rules in Purchasing Food—Prussic Acid Poisoning—Effects of Common Food Stuffs—Hoven—Good Permanent Grasses as Food—Breeding and Calving for the First Time — Signs of Pregnancy — Of Parturition – Calving—Protracted Labour—Premature Labour—Means of Preventing Epizootic Abortion—Vaccination—Straining—Clamps—Cow Breeches—Protusion of the Vagina — Milk-Fever — Methods of Treatment — "Reliance" Syringe—Dr Watney's Improved Air Injector—Trembling or Loupin' ill —Weed--Inflammations of the Udder—Choking—Stocking—Cow-pox —Foul in the Foot—Lameness—Swellings of the Limbs—Mange.

TREATMENT **of Dairy Cows.**—It is of the utmost importance to have the cows, the byres, and everything connected with them kept scrupulously clean, not only because the produce is so easily injured by the presence of any impurity or odour, but on account of the necessity of perfect health and comfort in the animals to attain the maximum of production. Sufficient and well-regulated ventilation maintains the temperature at a few degrees below 60° F., and prevents cows losing their hair and becoming too bare and susceptible to cold when turned out for water in winter, or to grass in spring; it also keeps the atmosphere pure and sweet. This may be aided by swilling the gutter daily with water, where means admit of the practice. Regular grooming during winter is necessary with cows, as with all animals that are tied, and are thus prevented from rubbing or licking their skins or being licked by others on itchy parts. General comfort is synonymous with more produce or better condition, with a given amount of food. March and April is the usual calving time for cheese- or butter-making summer dairies, so as to have cows coming to their "flow" within two months on getting a full supply of grass—May, June, July, and August being the best months for abundance. Heifers calve, usually, a month later. Many pedigree cows, being more or less precarious breeders, are permitted to calve at any time; but the best period is soon after the New Year, to give the young as much time as possible to grow before the grass comes, and to secure at the same time an advantageous position for showing, by being early in the regulation Herd Book year. Where milk is sold, more cows than in the case of other systems are "calved-down" in autumn, to provide for the winter demand, owing to the necessity of maintaining two-thirds of the summer amount. Cows go to pasture either before or after 1st May, according to the climate, having been gradually prepared by a short daily run over young grass, which is usually early. The amounts and varieties of forage crops sometimes given while cows are being milked, have already been stated. Three or four pounds of cake, supplied to each animal daily while on pasture, increase the amount of produce; but unless in special cases, where the pasture is insufficient or requires manure, it is a question if the practice pays when dairy produce is at ordinary prices, among other reasons, because cows thus treated are more difficult to support in winter, and they also break down more quickly.

Milking is usually done twice a day, in the house if possible, as cattle are there more at rest in the shade and free from flies; moreover, milk is kept cleaner, especially in wet weather, when milking-yards get muddy, and when rain washes impurities into the pail from the skin. All dirt adhering to the udder (more usual in winter than in summer) should be wiped, or, if necessary, sponged off to prevent taint in the milk. Open-air milking may be necessary when cows pasture at a great distance from the farm-yard; and, again, if cows have to be milked in a very close, warm byre, as they run the risk of being chilled when turned out at night in autumn.

It is sometimes necessary to milk three times a day when the udder is hard and swollen, as it frequently is soon after calving; when there is an excessive secretion and milk running from the teats; or when warm mid-day milk is wanted in a local trade, as in the cases of the Edinburgh and Leith dairies described in Chapter XVI. More milk can thus, on the whole, be got, but the additional expense militates against the practice, unless when the cow's comfort or the circumstances of trade urgently demand it.

Except in those districts where they are wintered out-of-doors, cows are, as a rule, kept in the house overnight when autumn frosts and cold or stormy weather come on, to prevent, it is generally believed, the quantity of milk falling off rapidly, with the result that they can easily be put dry at any time. For the first few nights of indoor life the yield shrinks, but it increases as the animals become accustomed to the change, and remains fairly constant for a few weeks. Experiments at Harper Adams Agricultural College have given results contrary to the general belief, and have repeatedly shown that the best results are got by leaving cows outside until it is time for them to dry off. The climate has no doubt something to do with it, and it is unlikely that the Harper Adams experience would succeed much further north.

During winter they are let out only once daily—or better, twice, if the fodder has been salted—to drink water and to lick their skins. They do best of all when water is within reach at all times so that they can drink at will as, *e.g.*, in a self-filling water-trough between two cows, large enough to admit the nose of one cow at a time, raised 12 to 15 in. above the front edge of the feeding-trough. When the ground is frost-bound and slippery, water should be carried to them. A walk of a quarter of a mile to the water before drinking, and the same in returning, prevents shivering, which frequently occurs when cold water is given in the house. The exercise also keeps the limbs in good condition, and helps to maintain the cow's health.

"**Blain**" is a disease to which milch cows are subject, often occurring soon after calving if they be turned out to drink and stand about in cold weather, but the initial cause is to be found in some derangement of the digestion. This is followed by a "disturbance of the nerves of the blood-vessels, which allow their fluid contents to escape into the surrounding tissues." There is consequent swelling about the head, particularly of the eyes and muzzle. "Tears flow over the face, and a discharge escapes from the nose, while the breathing is loud and difficult." A powerful stimulant, as whisky and hot water, should be given, followed by a dose of 8 lb. of warm treacle, or 1 lb. of salts if treacle be not at hand.

Cows acquire the habit, especially if they go on the same pasture from day to day, of finding the way towards the milking-place at the right times. The hours for milking should be regularly kept, and should divide the twenty-four hours into two equal parts. Each cow knows her stall in the byre, and if not disturbed will usually go directly to it, unless by the way she be tempted at times to steal food from a neighbour's allowance.

If cows are constantly milked by one person for a length of time, they often "keep up their milk," or "do not let it down," should another milker be introduced. It is a good rule in dairies to change the milkers regularly to avoid this chance of loss. The custom has other advantages: it apportions each milker a fair share of "stiff" or difficult cows, as well as of those easy to milk, and prevents an inferior milker "putting the milk off," or "drying" certain cows, by continuous bad milking.

Milking should be performed as quietly, quickly, and thoroughly as possible. If all these requisite conditions are not attended to, the quantity of milk soon falls off. One of the greatest difficulties of the dairy farmer is to find good milkers. A cow must not be struck or excited in any way ; as, in addition to the small quantity of milk given, the quality may be so injured, that when mixed with normal milk, it has been known to affect the milk of a whole dairy.

A calf takes about three or four minutes to suck a cow dry. Milking by hand should come as near this as possible. A good man (or a woman in Scotland) milking ten cows (a usual and ample number) will finish the work in an hour if it be done by contract, except for a week or two at the height of the grass season when the full flow of milk is on. When milking is done in the ordinary way, with no special inducement for haste, nearly two hours are taken up. An hour and a half may be stated as a good average time for a full milking.

A milker should sit on a stool close to the animal, and hold firmly between the knees a "handy" or pail, large enough to contain all the milk, thus doing away with the necessity of rising to empty a portion of it into the receiving- or carrying-can before the operation is finished. The arm next the cow's hind leg should be placed close to it, to be ready to press back should she attempt to kick. To ensure safety from kicking, some nervous milkers tie the hind legs together at the hocks. The practice is as old as the civilisation of ancient Egypt, and, if it were always done without pain to the animal, there would be no objection to it; but there is the risk of careless milkers doing it roughly, and thereby irritating and chafing the skin. It is better to "dry milk" or handle young cows for some weeks before calving to break them in, and by gentle treatment coax them to stand quietly. Special care is necessary immediately after calving, while the udder is hard and painful. Sometimes a nervous or wicked cow, or one with sore teats—arising from cow-pox, or attacks of flies, or exposure to cold east winds, or to chilly nights with heavy dews in summer—will stand in no other way than with a man holding her head with a finger and thumb in her nostrils. After a time, in many cases, the presence of a person near the shoulder is sufficient, without holding, showing that if care had been bestowed at first this unnecessary expense and trouble might have been avoided. Sometimes an intractable cow is secured by "bull-dogs," "humbugs," or "sister hooks" put in the nostrils, and by a rope attached tied to the railing in front.

There is no "right" and "wrong" side of a cow on which to milk. In double-stalled byres the milker places himself between two cows, milks one from the right side, and then turns round and takes the other on the left. It is well to train a cow, especially a show animal, so that she can be milked from either side, as this tends to keep the udder more evenly balanced. The near-hind and off-fore, and off-hind and near-fore teats should be milked together alternately.

Manipulation of the udder after milking, to secure the removal of the last rich milk of the composition and character of "strippings" with round 10 per cent. of fat, was originated by Dr Hegelund in Denmark about the beginning of this century. The method was extensively tested by Professor F. W. Woll at the Wisconsin Agricultural Experiment Station and in twelve other Wisconsin dairy herds, over a period of four months with cows at all stages of lactation. The average daily gain of milk was 1·08 lb., and of fat 0·1 lb. The largest amount of increase obtained from one cow was 5·5 lb. per day and the smallest 0·2 lb.

Cows with very small teats, especially when swollen after calving, are very difficult to milk, and tiring for the hands of the milker, as only the forefinger and thumb can be used. Others are "stiff" to milk, from the passages of the teats being small. These can be widened by inserting a form of bistoury, with a cutting surface on the outside of the thinner of two blades that open like a glove-stretcher, but it should be used only by a veterinary surgeon and after careful antiseptic preparation. When this operation is overdone, milk flows without the action of milking. A safer method of improvement, in ordinary hands, is that of using a small cone of metal or wood (in preference to ivory, sometimes recommended), which, between milking times, is greased and left in the canal of the teat to distend it. The bistoury is sometimes used, but not often successfully, when a cord forms at the neck of the teat, through the contraction or growing up of the milk diaphragm—usually the result of suppuration. To soften them before milking, sore teats should be well smeared with vaseline or hog's lard, and after the operation dressed with carbolic oil, or a lotion of Goulard's extract two parts, olive oil one part, and glycerine one part. If the skin of a teat is very tender, the milk may be

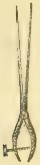


FIG. 26.
BISTOURY (open).

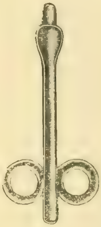


FIG. 27.

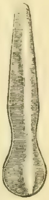


FIG. 28.

METAL AND IVORY PLUGS, SELF-RETAINING.

withdrawn for a few days by a silver milking tube or syphon (Fig. 29) while the sound teats are being milked. A piece of red yarn or tape ought to be tied to the tube to prevent its being lost if dropped among the litter.

Milking machines have been greatly improved in recent years, but it can hardly be said that the combined sucking and boxing action of the calf, which encourages milk-secretion, has been perfectly imitated, or that they give better results than are obtained by expert hand-milking. Mechanical-milkers, however, have not to be pitted against experts, but against careless or unskilled and over-paid hand-milkers; and even such are not always to be found in this country in sufficient numbers to supply the increasing demand. In Australia, where labour difficulties are still more acute, the milking-machine is already thoroughly established. In New South Wales in 1905, over 10,000 cows were milked by mechanical means, and the number has vastly increased since that time.

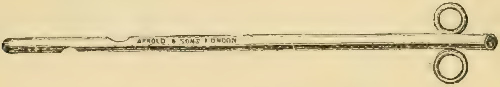


FIG. 29.—SILVER MILKING TUBE.

There are many **varieties of milking machines,** but in the mechanism of the most successful of them one or other of three principles is usually included. In the case of the first, the milk flows by gravitation through perforated silver-pointed syphons inserted into the teats. This self-acting cow-milker affords relief to an animal suffering from galled teats or a swollen udder, and ought to be more extensively employed in this connection, but it is of no practical utility except as a temporary remedy. The insertion of syphons into the teats except under antiseptic conditions is liable to induce mammitis.

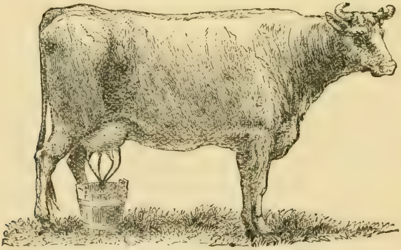


FIG. 30.—THE JERSEY CREAMERY CO.'S SELF-ACTING COW-MILKER.

In the second class of milker, suction is adopted, together with more or less intermittent lateral pressure, in imitation of the natural action of the calf, through the creation of a vacuum by means of an exhaust pump.

The Lawrence-Kennedy "Universal" Milking Machine[1] has for years been pronounced to be a practical success by people who are best able to judge, viz., men and their wives who live by dairying, and attend personally to the work, and who have fitted up the apparatus at their own cost. Quite a number of those who speak highly of it had unsatisfactory experience of the "Thistle" and Murchland's machines. The milker shown as Fig. 31 is now declared by them to extract more milk than hand-milking such as they can command, and to exercise no evil effects upon the cattle, which with rare exceptions stand quietly and show evidence of contentment while the milking goes on.

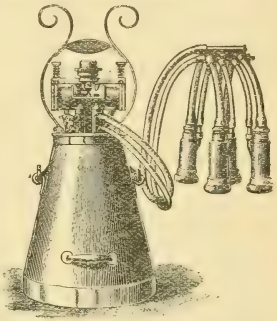


FIG. 31.—MILK-PAIL, PULSATOR, FOUR TEAT-CAPS AND CONNECTIONS.

The machine consists of a specially constructed and hermetically sealed milk-pail, supporting a pulsator, in which there is a right- and a left-hand cylinder with pistons, which work alternately and produce the intermittent action or pulsation. Each pail, large enough to hold the milk of two cows which are operated on at one time, has two sets of flexible connections which lead to the cows, and are each terminated by four teat-caps. By another flexible connection the exterior of the milking pail is put in communication with a vacuum pipe extending through the byre above the heads of the cows. This is connected with an air exhauster which draws the air from the pipes and actuates the pulsators. The pulsator in turn operates the teat-caps, which consist of white metal tubes large enough to admit a cow's teats of any size, lined with thin flexible india-rubber tubing, which by a series of contractions and expansions manipulate the cow's teats in imitation of the action of a calf, thereby extracting the milk and conveying it to the pail from the udder in from six to ten minutes. The upper end of each flexible rubber tube is folded back over the open end of its metal cap, which it clasps, to make a close joint to permit of the contraction and expansion of the rubber by means of air forced by the action of the pulsator between it and the metal casing which it lines. Experience has shown that a man or a dairymaid with an assistant to carry away the milk, can with one pulsator easily milk per hour 15 to 20 cows; and an intelligent operator can attend to four pulsators at the same time, consequently the labour of attending four pulsators is little more than that required for one. The apparatus suitable for dairies of 20 to 100 cows ranged in cost before the war from £50 to £100, and the advantages are much greater on a large than on a small scale. In the latter case a machine is more a matter of convenience when labour is not to be had than one of saving outlays; and on a mixed arable and dairy farm it is not likely rapidly to replace the hinds' wives who are able and willing to milk for reasonable payment. Any of the common sources of power on the farm is suitable for producing the vacuum through the medium of an air-pump, which is pronounced more reliable than a steam ejector. The oil-engine has so far proved the most convenient form of power in this country. The apparatus is easily cleaned, and if this be done with reasonable care the milk keeps sweet longer than when drawn by hand, as contact with injurious germs is avoided.

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[1] Made by P. R. Fleming & Co., 16 Graham Square, Glasgow.

Another successful machine on almost the same lines as the foregoing, is made by Wallace, Castle Douglas, N.B. It has four pulsators, one for each teat, in place of one, and on that account is preferred by a great many people.

The usual period of lactation is between nine and ten months, giving the cow a rest of two or three months to prepare for the next milking period. Cows naturally take this time, more or less; but they are to a considerable extent affected by the kinds and quantities of food given, and by the general treatment. Some continue to yield milk till the next calving, but without a rest they are liable not to produce so abundantly the following year—although by continuous milking the danger of milk-fever is reduced.

M. Guénon's "Escutcheon" or "Milk-Mirror" theory[1] holds that the extent of surface of the udder and the thighs that is covered with hairs turning up and out (not down, like those on the rest of the body), is an indication of the amount of milk the cow will give. If the surface covered by the reversed hair is large and broad above the udder, extending far on to the thighs, the cow should be a good milker; and, if it be broad and smooth near to the setting on of the tail, the flow should last well out at the end of the season. Great attention is paid by a few enthusiasts to the escutcheon theory in America and in France, but it is little regarded in Great Britain. The explanation seems a very doubtful one, viz., that the arteries supplying the udder terminate in the skin, in the region covered by the escutcheon, and somehow turn up the hairs. If there be a large area thus marked, it is supposed to indicate that there are many terminations, and consequently large arteries, devoted to the supply of milk-producing blood to the udder. The size of the milk-veins, carrying away the residue of the blood which passes through the udder in the process of milk-secretion, is a much more reliable indication of the "depth" of a cow's milking capacity.

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[1] The system was instituted by Mons. François Guénon, of Lisbourne, the son of a poor gardener, and a great student of Nature as represented in the vegetable and animal kingdoms. As far back as 1814, while tending the household cows, he believed he could trace a relationship between the yield of milk and the form of the "gravure" or escutcheon. After making further inquiries, which tended to strengthen his belief, he began business as a cattle-dealer in 1822, and dealt in cows of different nationalities. The result of his long and careful observations led him to classify animals in three groups according to size—large, middle, and small: the signs he divided into eight classes, and each of these classes into eight orders. From an intimate knowledge of their variations, he claimed to be able to indicate the quantity and quality of milk a cow would give daily, and the length of time she would continue to give a good yield. In 1837 he stated his results before the Bordeaux Agricultural

Dr James Robertson, when Canadian dairy-expert, enumerated the following **points by which to judge a cow**:—

> "(1) A long udder lengthwise of her body, and very elastic; the elastic quality means room to make milk. (2) A soft skin—a mellow skin, covered with mossy, silky hair; the skin, if coarse or harsh, means sluggish digestion inside, and that means an expensive cow that does not digest her food or thrive well. (3) A cow should have a large roomy barrel, with broad ribs wide apart, for holding plenty of good, rough, bulky, cheap feed; it should be filled twice a day. (4) The milk-veins under the cow's belly should be prominent; prominence is a far more important indication than actual size would be. (5) Firm muscles in the abdomen mean good constitution; they are the best evidence of endurance and thrift that can be found in a cow, and endurance to stand the strain of giving milk continuously is what is wanted. (6) A cow should have broad loins with long rumps, a rather long lean neck, with clean-cut face and prominent eyes."

"**Spayed" or de-sexed cows** will milk constantly for years, and give, on the aggregate, a larger yield than cows which calve annually in the usual way. They are specially suited to outlying districts in the colonies, where there is grass all the year round, and where settlers' single cows are many miles from a bull. The milk resembles that of farrow cows, being richer than when cows have been some months pregnant; but the great gain is in the conservation of the food and energy necessary to produce a calf.

Committee, and in 1838 to the Agricultural Society of Aurillac. His views were accepted after test trials of the system, and by a few who have undertaken the great labour of mastering the details it is pronounced to be, when taken in association with a number of other characteristics, an excellent guide in the selection of cows possessed of good dairying qualities.

The best method employed in putting a cow dry, to avoid the risk of losing a quarter through suppuration, is to stop milking, smear the udder with tar (see page 372), and reduce the quantity of food. Milking once a day, every second day, or after a few days when the vessel swells up, is in practice a mistake. The action of milking encourages the secretion of milk, which would otherwise never form, and only retards the drying process. Bleeding from the jugular vein is at times adopted, and a dose of 16 oz. of Epsom salts is not infrequently administered. This is the only time that salts may be given to a cow in milk, as they reduce the flow, and to a great degree permanently for the season. These extreme measures are most applicable to cows giving a considerable quantity of milk, or that have been put to grass before going dry.

Inferior fodder should be used up when cows are "out of profit" or "resting" from the duties of milk-production. If the fodder be very old or unattractive, a few roots require to be given in addition; or it may be necessary to sprinkle it with salt-water or treacle-water from a rose-can to improve the taste and hide the smell if they are not of the best.

There are three points with regard to which a farmer should satisfy himself before choosing food-stuffs:—*1st*, That the price, according to feeding value of the food which he selects, is as moderate as that of any equivalent material he could buy in the market. This rule is too often neglected by the farmer, and accounts for the prices of certain well-known feeding stuffs soaring at times far above their real feeding values. Too many farmers in this country are slow to learn and loath to make changes, especially in matters where scientific advice should be called in to determine the quality of a new material, and they consequently suffer from the results of this state of inactivity when they come into competition with their more progressive neighbours, and with foreigners.

2nd, He should employ those foods that do *not* produce a disagreeable taste in milk or butter—such as cabbages, mangels, carrots, potatoes, and the more common meals and cakes—and avoid as far as possible the use of turnips. Swedes are not quite so objectionable as common turnips, which when given to cows induce a disagreeable taste and smell in their milk and its products. The proper time to use turnips in dairy management is when the cows are dry, or in a case of necessity, as when other descriptions of succulent food are not available, a small quantity may be given immediately after milking; being it is thought at that time less injurious.

3rd, He should use the proper foods to suit the condition under which an animal is placed; for example, cotton-cake given in excessive quantities to cows in calf will at times lead to the death of calves when they are about ten days old. Three or four lb. per day may be given with safety—undecorticated cake, if the animals are on grass, as it possesses astringent properties, and counteracts the tendency to excessive looseness of the bowels. Decorticated cake, ground fine on account of its being hard to chew if in lumps, is better given in winter; or, in summer, on the pasture, mixed with maize-meal.

Prussic acid poisoning was frequent in 1905 and early in 1906, among dairy cattle, owing to the Java bean *Phaseolus lunatus*, being used to meet a deficiency in the usual pea and bean supply for the dairy. There are three forms of this legume: (1) The cultivated and domesticated variety with white seeds, which are safe to use. (2) A semi-cultivated form, producing seeds "light or dark brown with violet hues or purple patches." These contain small amounts of a glucoside (phaseolunatin) which during digestion evolves prussic acid. And (3) the deadly wild form, in which the seeds are generally violet, though there is also a wide range of colour—dark brown, purple, and light brown specimens being met with.

The *symptoms* of illness after a small handful of the meal has been eaten by a cow, are trembling and twitching, and a rise of temperature to probably 105°. In fatal cases, after an ordinary feed of the meal, the post-mortem reveals "acute inflammation in the fourth (or true) stomach and the bowels, and hæmorrhage all over the small bowels," as seen in cases of acute irritant poisoning.

At Drumbuie, near Sanquhar, N.B., a startling loss occurred on 1st January 1906, in a dairy of pedigree Ayrshires. Within about five minutes after about 3 lb. of the meal mixed with water had been given to each, the cows "presented the appearance of animals choking, and they bellowed loudly and appeared to suffer acute pain. One after another dropped, and within half an hour twenty-four of the cows were dead."

At Cockerhurst, Shoreham, in Kent, and other places in England and Scotland, a limited number of cows died in similar circumstances, but a good many were saved by prompt treatment for irritant poisons. (See page 282.)

Effects of Common Food-Stuffs.—Bean-meal, produced by grinding the common field bean, perhaps to a greater degree than anything else, increases the flow of really good milk, and is only dangerous to give (unless in immoderate quantities) to cows under high-pressure feeding.[1] Meals made from leguminous seeds, when consumed in large quantity by animals, have a binding or costive tendency, being deficient in oil. Bran counteracts this tendency, and is itself excellent for encouraging milk-production. Treacle is now increasingly used to fulfil the function of bran. Wet brewers' and distillers' grains are also "opening" or loosening to the bowels, and greatly increase the flow of milk. When used freely, grains injure the breeding-powers of cows, and are in consequence of most service in town dairies, where the fattening-off process is associated with milk-production (p. 330). A small quantity of malt dust in a mixture gives it relish, and as a food it is also a good milk-producer. Clover, green and wet, is a most dangerous food to give to cattle not accustomed to eat it, as it produces hoven, especially in the case of cows which are ravenous feeders. Clover should consequently be given dry, and at first only in small quantity.

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[1] Bean-meal has also been given with satisfactory results, when, for some unknown cause, the curd would not adhere in the cheese-press.

Hoven is the disorder which is induced on the suspension or retardation of the function of digestion. It may be acute, due to some sudden ailment, and dangerous to life; or chronic, the result of a derangement of long standing. In the acute form, through the muscular contractions of the rumen being in abeyance, the contents of this first compartment of the stomach are neither returned to the mouth to be remasticated nor passed on to the other compartments, but remain an inert mass in the rumen, undergo fermentation, and give off gases which speedily distend the organ; more especially is this the case when the food is of a succulent nature. Pressure is thus brought to bear upon the diaphragm, which is unable to act, and ultimately the animal, if not relieved, dies of suffocation. *Treatment.*—In the case of "eild" cattle, 1 oz. of turpentine soaked into dry meal, and administered in cold gruel or cold water, may overcome the disorder if given in good time. As turpentine permeates the whole system and flavours the milk, cows "in profit" should be drenched with 2 quarts of hot beer, or a pint or more of whisky made into hot "toddy." In a case of urgency, instant relief is secured by puncturing the rumen with a trocar and cannula, at a point on the left side equidistant from the anterior spine of the ilium, the transverse processes of the lumbar vertebræ, and the last rib. The cannula is left in the wound for a little to form a free vent for the escape of gas. On its withdrawal, the wound in the stomach contracts on account of the opening having been made when that organ was greatly distended. A clean pocket-knife may be used for the operation in a case of extremity; but as there is nothing left on its removal to preserve the channel, a portion of the food blown from the stomach by the force of the escaping gas is liable to lodge under the skin, and in course of time to produce a suppurating

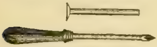
FIG. 32.—TROCAR AND CANNULA.

sore. The chronic form of the ailment should be treated by the administration of repeated doses of salts, with 2 oz. of a mixture of ground gentian and ginger, or of treacle along with ½ oz. of carbonate of ammonia or turpentine,[1] as tonics.

A mixture of good permanent grasses and other plants, grown on soil naturally fertile, but in a state of Nature, is by far the best food for making the most perfect dairy products. Grass or forage crops from highly manured land or irrigation meadows, although they may increase the quantity, deteriorate the quality of milk, and more particularly of its products, and make it often more difficult to manipulate in manufacture. The remark relating to quality (which does not refer to the total amount of solids) also applies to cakes and most other supplementary foods given to cows while on the grass. If there be not an objectionable taste or smell, the natural conditions are not infrequently changed in some other way—a change which would be observed, for example, in the altered texture, and in the diminished keeping power of the butter, or in a greasy condition of the cheese.

Breeding, and Calving for the First Time.—The ordinary dairy farmer should not buy, but breed his own stock if possible, paying the greatest attention to selecting the calves of the best milkers to rear for bulls and heifers. When this is done there is less risk from imported disease; and, as a farmer is able to breed better cattle than he can buy, he can with care produce animals of better quality than are to be found in the market. The milking powers of a herd may be vastly improved within a few years by this means.

This is no new doctrine, for Marshall's *Rural Economy of Gloucester* (1789) says:—

> "Dairy farmers should soon be beggared if they had their cows to buy, and that they know what they breed but do not know what they buy, as, if a heifer is not likely to turn out well, they sell her; on the contrary, if they went to market for their cows, they must buy the outcasts of other breeders. Besides, they endeavour to breed from known good milkers, such as milk well, not only soon after calving, but which will *hold their milk* throughout the summer and the latter-math months; whereas in the market they are subject to chance and the deceptions of drovers: the most they have to judge from is the *size* of the bag at the time of the purchase. In suitable situations, then, there can be little doubt of the propriety of every dairyman's rearing his own cows."

In buying cows the birth of the last live calf and the date of the last service should be ascertained. If there is an unusual gap between the dates, look out for contagious abortion.

The arguments used by those who advocate the opening of our ports to the introduction of live **cattle from Canada** on behalf of dairy farmers, are entirely fallacious. Selected home-bred cattle can always be depended upon to give annually 200 gallons of milk more than cattle bought in the open market from whatever source, and the cost of feeding an inferior milker is little less than that of a good milker.

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[1] Turpentine should not be used too frequently or in excessive amount, as animals are liable to die from the effects of turpentine poisoning.

To fill up the places of cast cows—those that have become old, or have proved unlucky or unsuitable—**young heifers** to the number of between one-fourth and one-third of the total of the dairy should be available each year. Whether it be the better practice to "calve-down" heifers at a little over two years, or a little over three years old, is mainly a question of feeding and environment. If cattle are kept in thin condition, as the ordinary Ayrshire is in its native country, the best results are obtained by calving at "three-years-off." At two years, an animal, if poor, is too small, will not milk satisfactorily the first season, and is very liable to "miss the bull" and remain farrow the following season. If heifers are well fed, and made to calve at two-years-off, as in the case of Channel Islands cows and well-bred milking Shorthorns, the natural development and growth, which continue even for years afterwards, are led into the lines of milk-production; and the organs which are then most active are not allowed to become atrophied from inaction, or gorged with fat in the attempt of Nature to rid the circulatory system of a superabundance of fat. Nature indicates the proper course to be followed by well-fed animals, if not over-fat, coming in season sooner and more regularly than those in poor condition. Very fat cows are most uncertain breeders, and even when this difficulty is overcome they usually produce small calves.

"**Sterility and infecundity in cattle** may be due to a variety of causes, some of which are irremediable—disease of the ovaries, for instance. Others are capable of being combated: the most common forms being stricture of the *os uteri* (the passage leading from the vagina to the womb) and contagious abortion. Stricture ought always to be looked for when difficulty is experienced in getting a cow in calf, and the examination made when the cow is bulling. The hand and arm, well greased, is introduced into the depths of the vagina and the entrance to the uterus examined. Under normal conditions the fingers can be admitted into the canal, but when it is constricted a quill pen could not be passed, and fertilisation is then impossible. In very many cases the employment of a large probe at first, followed by the finger, a good deal of force being often needed, is sufficient to ensure dilatation. It may be necessary to use a dilator, or in some cases to incise the walls of the *os* before the stricture can be removed. The success attributed to insemination is frequently due to the fact that manipulation of the *os* has caused its dilatation before or during the use of the inseminator."

"Great difficulty is often experienced in getting cows to breed after they have been affected with contagious abortion. It has been suggested that this is due to an acid condition of the vaginal mucous membrane, and hence injections of a dilute solution of bicarbonate of soda are recommended. Solution of perchloride of mercury, 10 grains to a quart of tepid water, injected into the uterus and also into the sheath of the bull a few days before copulation, is perhaps the best treatment for this form of the trouble, which is no doubt associated with changes resulting from the action of the microbes to which epizootic abortion is due."—(W. R. D.)

The usual **period of gestation** is, in round figures, nine *calendar* months. Lord Spencer's table (see *R.A.S.E. Journal*, 1838) establishes the average period for healthy cows at 280 days.

Signs of Pregnancy.—1. A cow does not come in season when pregnant; otherwise she should do so at intervals of about three weeks.[1] The exceptions to this rule are, that extremely poor, or, on the other hand, very fat "eild" cattle may not come "a-bulling" so often, while a few continue to bull although they are pregnant. This latter peculiarity, or nymphomania, has been noticed during the early stages of tuberculosis, should the disease affect the organs of reproduction, but also at times without any apparent cause.

2. The right side of the belly becomes enlarged, and after a time the calf, in the form of a hard lump, can be felt with the hand near the flank, and seen to "struggle" or "quick" at times, especially when the cow drinks cold water.

Signs of Approaching Parturition.—1. Enlargement and firmness of the udder and teats. 2. Fluid may be drawn from the teats of a more milk-like character and less watery than that found in the teats of "eild" cows. 3. Loosening and enlargement of the hinder parts, as the external organs of generation, and relaxation of the pelvic ligaments. Large heavy cows find it difficult at this time to rise or walk. These three indications frequently last for days. 4. Within a short time of calving, which may extend to a few hours, a cow becomes restless, lies down and rises frequently, and whisks her tail, as if in pain. 5. The right side becomes flatter when the calf passes into the pelvic bones as the labour period begins.

Calving.—It is bad practice to assist a cow too soon, and it is equally wrong to leave her in difficult labour until she is worn out and the pains become weak. The head and legs of the young within the mother are doubled up, and it assumes the form of a ball enclosed within a bag called the "amnion," "clean," "fœtal-membrane," or "after-birth." The bag contains a slimy fluid, in which the calf floats, and which lubricates the passage when the membrane is broken. When assistance is given, the hand and arm should be well rubbed with carbolic oil before being inserted. The right position for the calf is with the head and fore-legs "forward," like a man about to dive, the head and neck being stretched out so that they rest upon the limbs. When the hind-legs appear first it is not necessary to turn the calf before pulling as in the case of many other false presentations. The stifle-joints may catch on the pelvic bones surrounding the passage and a good pull, first on one leg and then on the other, may be required.

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[1] In summer, œstrum returns about the nineteenth day; in winter, its recurrence is slower by twenty-four or even forty-eight hours.

The cow should lie on her side during the operation (although in some districts she is made to stand in the fashion portrayed in the tomb-paintings of ancient Egypt), and the pulling, which is done by the fore-legs, should not be straight but inclining slightly towards the hocks of the cow, one man distending and freeing the *os vaginæ* with his hands. A cow should, as a rule, be made to rise immediately after calving to prevent after-straining. If the animal be exhausted and there is no pressing, she may be watched and allowed to rest for a few minutes. She should have a short drink (say 1 gallon) of cold water with a little oatmeal thrown into it, and this may be repeated every few hours until thirst is quenched. It is an unnecessary precaution to warm the water, and a cow will often not drink it warm. All that is necessary is to beware of giving so much at a time as to chill her.

In protracted labour stimulants are required, as one pint bottle of whisky, a quart bottle or more of beer, or half an ounce of carbonate of ammonia. A mouthful of cold water is also beneficial.

Many highly-strung, in-bred cows, conspicuously Shorthorns are liable to go mad at calving and become dangerous. Early Bates cattle were specially susceptible to this. If not under skilled control the excited mother may bellow and rush at the attendant to horn him, or furiously attack the calf, endeavouring with open mouth to bite it, clawing it with the fore hoofs, and trying to finish it off by kneeling heavily on it. In a day or two as the excitement cools down a little, the cow will lick the calf and suckle it normally.

The Common Causes of Protracted Labour are:—1. False presentations. 2. Death or deformity of the calf, at times necessitating the cutting up and removal of it in pieces. Sometimes it becomes mummified, and remains in the womb for years: the cow coming in season, but being unable to breed.

Usually it rots, and is discharged from time to time in small pieces or as disintegrated putrid matter. In such a case the animal is liable to get into a very lean condition and poor state of health, and may even die of blood-poisoning. 3. Disease, or abnormality of any of the internal reproductive organs.

The "cleansing" hangs for a time after the calf is born, but should drop within a few hours. *Normal Treatment.*—Give opening food-stuffs, as linseed tea, bran-mashes, and treacle.

Abortion frequently takes place soon after the cow has conceived, or within the first month, and then the circumstance is rarely noticed by the attendant. When a cow calves before her time, usually from the fifth or sixth month onwards, she is said to "slink," "cast," "slip," or "pick" calf. The calf is often dead, but it may be alive and continue to live even if born so early as the seventh month, or in very rare cases two weeks earlier,[1] while calves born at the eighth month usually die. The loss to the owner is generally great, as there is, as a rule, no adequate preparation by the cow for milking; but this is a rule to which there are exceptions with certain animals and under special conditions.

Causes of Premature Labour.—1. Eating ergotised grass in autumn. 2. Injury, as from horning by other cattle, hunting by dogs, crushing through narrow doorways, shaking and bruising on a railway journey, etc. 3. Walking through a dung heap, or over boggy or soft land, and getting strained. 4. Very cold or foul water, or too many frosted turnips, especially if given in the house while the animal is not moving freely about. 5. Superpurgation, either natural or induced by physic. 6. Infection arising from association with newly aborted cows which are affected with *Bovine Epizootic Abortion* (produced by a very small oval or rod-shaped bacillus), or from the use of a bull which had served an aborted cow even six months before. This is the most common, most insidious, and dangerous of all the causes of abortion. A good illustration occurred in 1905 among animals belonging to J. W. Wallace, Ford, Thornhill, N.B. On 20th December a Galloway bull that had served an aborted cow on 20th September was put to seven Irish Shorthorn heifers. All aborted, the first heifer three months before she was due to calve. Five went till within six weeks and one within three weeks of their proper periods. No other heifer in the lot of twenty herding together aborted, but they were served by a different bull. This fact also indicates that heifers which have become contaminated with the organism may not communicate it to others until after premature labour. That cattle after abortion do communicate the tendency to others was illustrated a few years before on a neighbouring farm, Holme of Blaplain, Dumfriesshire, where cows from a contaminated dairy repeatedly broke through a fence, and, mingling with the Holme cows, gave them the disease.

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[1] A Shorthorn bull calf was born at six and a half months in the Marquess of Winchester's herd at Amport Park. It developed into a normal animal from a very insignificant beginning, and was sold at the displenishing sale on 16th September 1909 for 14½ guineas, but got a chill in the train on the way to its new home and died.

Indications of approaching labour are usually seen for days, or even a week or two, before the crisis comes on. A cow should be removed from amongst the others whenever these appear. By taking the temperature the attendant on the outlook for signs of premature labour may receive warning of the approaching danger before any external evidences are visible. The normal temperature of a cow in a byre is not over 103° F., even when kept too warm and without proper ventilation, but it goes higher as abortion approaches if the affection be of a contagious nature. Quiet, and proper dieting, may sometimes avert an impending attack, if the calf be alive.

In cases of abortion the **after-birth** usually adheres firmly to the button-like connections (cotyledons) in the uterus, and, if not removed, part of it remains rotting for weeks. The cow then falls off in condition, and if she be not attended to there is danger of absorption of the fœtid matter into the circulation, septicæmia and death. Should the opening-food treatment not succeed in three to five days, the bulk of the membrane left should be taken away by the hand, which should be well smeared with carbolic oil before being introduced to sever the connections. Tepid water, containing 1 per cent. of pure carbolic acid, or one of the mixtures given on pages 363-64, should be injected to wash out the uterus and vagina twice a day. The operation necessary for the removal of the effete body is dangerous, if rapid decay of the "cleansing" is going on and putrid matter be present. The points of attachment to the uterus are left more or less in the condition of open sores, by which poison may enter the blood. Cows which have been thus treated do not readily conceive in the following season, unless they be disinfected, as described below.

Means of preventing Abortion.—(1) Cut over the seed stems of such grasses in the pasture as are liable to the attacks of ergot; (2) treat the cows gently; (3) supply wholesome food and pure water, and abundance of fresh air and sunlight; (4) keep them in sanitary surroundings, and especially avoid all communication with infected cattle or their droppings, and exhalations of all kinds: to this end, the "cleansings" from aborted cows should be burned, dipped into scalding water, or, with the calf, deeply buried.

Professor W. O. Williams wrote on the Prevention of Epizootic Abortion as follows:—

"Professor Nocard, of the Alfort Veterinary School, who has made the study of epizootic abortion in cattle a speciality, recommends the thorough and regular cleaning of cow-shed floors, and sprinkling with a solution of sulphate of copper (10 drachms to 1¾ pints of water); and vigorous vaginal injections of a disinfecting tepid fluid with a horse enema syringe. Perchloride of mercury in tablets easily dissolved in hot water, 10 grains to the quart, is probably the most simple and effective remedy. Every morning, when cleaning the cows, with a sponge dipped in the fluid, carefully dress the vulva, anus, and anterior surface of the tail of all of them. The intra-vaginal or intra-uterine injection always causes, especially in young cows, apparently violent expulsive efforts—but these in reality do no harm. Nocard has obtained the best results from the employment of this method, and he is of opinion that a single vaginal injection, given at the commencement of the treatment, will establish asepsis, but only when the daily sponging of the vulva and tail is strictly carried out."

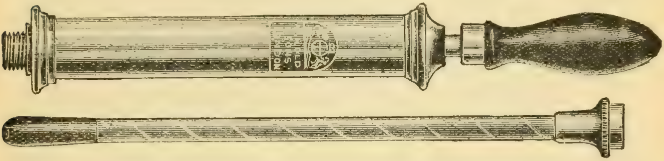

FIG. 33.—ABORTION SYRINGE (BRASS) WITH ELASTIC WEB TUBE FOR WASHING OUT THE UTERUS.

Leaflet No. 13, of the Department of Agriculture for Ireland, gives in greater detail a modern method of treatment.

"Concrete floors are strongly recommended in preference to any other kind that might shelter the germs of disease, also lime-washing the walls, and disinfecting the floor as well as the discharges from aborted cows at intervals with a solution of pure sulphate of copper (2 lb. to 10 gallons of water). Jeyes' Fluid (a good teaspoonful to a pint of water) is cheap and effective for disinfecting both cows and bulls. The bull is easily treated by squirting the Jeyes' solution up his sheath or "shade," about an inch of the end of a common rubber enema syringe being inserted a few times after a diseased or suspected cow has been served. A cow requires to be disinfected several times in the following way:—Pass the nozzle of the same syringe into the ring of the calf-bed, which is a small, round opening

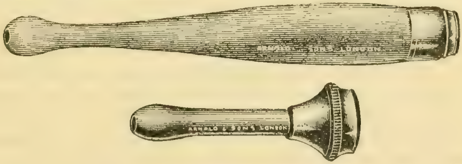

FIG. 34.—METAL NOZZLE FOR BULL'S SHEATH AND RECTUM PIPE.

found about 8 or 10 in. inside the 'bearing.' One hand should first be oiled with olive oil or butter, and passed in through the 'bearing' with the nozzle: the other hand is kept free to work the syringe. About a pint of the solution should be used each time, and the operation repeated once a day for a week and then once a week for a month, after which the cow may be left alone until about a fortnight before she goes to the bull, when she may have one last injection."

It is claimed that this treatment, together with the sanitary precautions prescribed, will generally lead to the settling of cows which keep on coming in service without being infected by the germs of contagious abortion.

A simple and satisfactory **American method of treatment** of isolated cows is worthy of attention in this country:—

"Irrigate the vagina with a lukewarm 3 per cent. solution of permanganate of potash; then a solution of yeast is injected into the vagina. One cake of compressed yeast is dissolved in a teacupful of water, and allowed to stand to ferment. To this ferment is added from a pint to a pint and a half of water. This is injected into the vagina, and it has a tendency to stop the discharge from the vagina better than any chemical that has so far been used. It also has the great advantage that it does not produce any irritation, which may occur by the use of strong carbolic acid and other disinfectants. This treatment can be adopted without skilled assistance."

Without preventive treatment abortion declines, and ultimately dies out, in a dairy, and the more quickly if newly introduced heifers be grazed apart from the others. A cow rarely aborts more than three times, and her tendency is to carry her calf a little longer each time, and ultimately to bear a calf that lives. (See Appendix S.)

The Veterinary Department of the Ministry of Agriculture and Fisheries (Publications Branch, 3 St James's Square, London, S.W. 1) issues a comprehensive, up to date, free Leaflet, No. 108, "Epizootic Abortion in Cattle, or Slipping Calf."[1] **Vaccination with "Anti-abortion A"** preparation is advocated, but only in the case of infected herds (after consulting a veterinary surgeon), with the object of "inducing in the inoculated animals a degree of resistance to the disease sufficient to enable them to carry their calves to full time, and so establish a high degree of resistance in a much shorter time than that required for the natural process to operate." "Anti-abortion A" is not a serum but a live culture of the bacillus, prepared at the Veterinary Laboratories of the Ministry of Agriculture and Fisheries, New Haw, Weybridge, Surrey, and sold to veterinary surgeons at half-a-crown per dose, carriage paid, to be used in strict compliance with regulations laid down for the guidance of the qualified experts, and supplied, on application, with the material.

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[1] See also Report on *Epizootic Abortion*, Part I. (Cd. 4742) and Appendix to same (Cd. 4863), and *Annual Report of the Chief Veterinary Officer for* 1914 (Cd. 8043).

"**Pressing,**" "**straining,**" **or** "**after-pains,**" producing inversion of the uterus, are very frequent after difficult parturition, being caused by injury to or irritation of the parts involved. The injection of laudanum and carbolic oil—carbolic 1 to 20 of oil—if done early, suffices to allay it. Carbolic oil, used alone in the first tried proportion of 1 to 7, has been known to increase the irritation where a scratch existed, and to drive the cow almost frantic.

When total inversion is imminent, a clean sheet (previously soaked in a disinfectant solution) should be stretched behind the cow to receive the uterus, which should then be smeared by the carbolic mixture recommended, and returned into position—often a matter of some difficulty, requiring strength as well as skill. Strong anodyne draughts, such as chlorodyne or laudanum in 2-oz. doses, are given to soothe and allay pain.

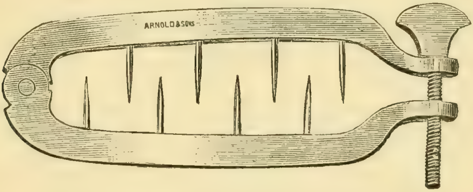

FIG. 35.—PROLAPSUS CLAMPS (WEST'S).

When the displacement of the uterus is noticed, before it protrudes to any great extent, it may be easily replaced by closing the hand (to prevent injury by the finger-tips) and pressing it back gently but firmly. If necessary, the uterus may be washed previous to replacement, tepid water being used on account of its producing less pain than a cold application. The hand is not withdrawn until the normal position of the uterus has been secured. One way to prevent its reappearing externally is to stitch across from hip to hip with clean white tape or wire drawn through three holes made by a penknife in the skin on each side, the tape crossing and passing over the lips of the vulva to give support. The treatment appears cruel, but is an effectual one in serious cases. West's vaginal (spiked) clamp, or tape-stitches through the lips of the vulva, used in common veterinary practice, accomplishes the object by nearly closing the orifice. To ensure safety, before any symptoms of pressing appear, and also in mild cases after it has begun, **cow-breeches** are of great service, but they are of little value when the pressure is intense, as they cannot be put on sufficiently tight to resist the effects of severe straining. Cow-breeches are made of strong leather, in the form illustrated in the accompanying figure, the four ends being fitted with canvas terminations which are not here shown. They are put on to prevent the sudden expulsion of the womb after calving. The tail of the cow rests in the bifurcation of the two upper ends. These cross over the back, and are carried forward and tied to a strong girth fastening tightly round the body in the region of the heart, while the other ends, conducted past the udder (one on each side), cross on the belly and are similarly fastened below. The floor of the stall under the cow's hind legs should also be temporarily raised, as by a wooden platform.

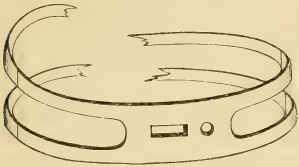

FIG. 36.—COW-BREECHES.

The dangerous operation of **amputation**, best performed by the écraseur, in the hands of an experienced veterinary surgeon, is at times necessary to forestall mortification when the uterus has been inverted, probably without the fact being discovered, and has become so congested that it is impossible to return it.

Protrusion of the vagina (the "body" in common language) occurs before and after calving, when some cows that are in high condition and well fed lie down. The proper treatment is to bathe the protruding organs to clean them, and wash with a solution of chloride of zinc, to stimulate the relaxed parts and to prevent the development of objectionable odours. The floor of the stall should be a little higher at the hind than at the fore feet of the animal; and the food given should be concentrated rather than bulky. Animals with such a constitutional and, most probably, hereditary weakness should not be retained.

Milk-fever or parturient apoplexy occurs not so much in fat cows, as is usually supposed, as among cows that are being well fed, and are full-blooded and thriving rapidly at the time. Many fat cows are in this condition, but very many that die of milk-fever cannot be said to be fat. Deep milkers are more liable to it than others, but only in the case of cows of more than one calf. It usually appears within three days after calving, but sometimes, though rarely, before it. Digestion is suspended, fever is not present as the name implies, but a subnormal temperature, serious disturbance of the nerve centres, and consequent loss of muscular power. "The disease probably results from the poisoning of the system by products (ptomaines) absorbed from the udder, which, acting principally on the brain and nervous system, produce effects very similar to those of very strong narcotics."

Preventive means may be employed to render remedial treatment unnecessary. It is advisable to restrict the amount of food for six weeks before calving (as by shutting in at night without food a cow that is liable to be attacked), and to keep the bowels open by giving bran or grass. If the udder be large and painful, milking should be done regularly—even ten days before calving. Should these preventive measures not prove sufficient, the other animals most likely to become ill may be bled and physicked a day or two before the calf is expected, or merely physicked with 8 lb. of hot treacle, or 14 to 16 oz. of Epsom salts, followed in fourteen or fifteen hours by a pint of linseed oil to counteract the secondary costive tendency of the salts. This practice may be repeated. All the foregoing treatment is directed to the reducing of the plethoric condition of the blood, and the keeping of the digestive system in good order, without at the same time doing anything permanently to reduce the natural flow of milk after calving. The calf, in all cases of danger, should be allowed to suck the cow for the first three days, and the bag during that time should not be drawn.

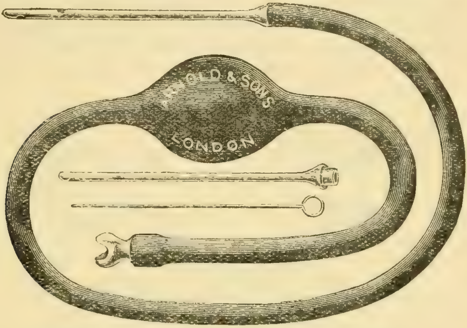

FIG. 37.—MILK-FEVER SYRINGE ("RELIANCE").

A successful treatment which was in use before the close of last century is that of pumping various solutions into the udder.[1] Iodide of potassium and various other fluids have been used, with good immediate effects, in the majority of cases, although the Report of the U.S.A. Department of Agriculture records 17 to 25 per cent. of deaths under the treatment. In this country many animals which after treatment recovered from the acute stage, pined and died a few months later, and others never regained their original milking capacity. The introduction of oxygen or atmospheric air by the rough-and-ready means of a bicycle pump, without sterilisation, has also been attended with beneficial results; but to make a certainty of success in the operation, it is necessary to carry it out with the greatest care. To this end, common air, which was first recognised by Andersen of Skanderbora as the best medium to use, requires to be sterilised and heated, and about a half-pint of it gently passed into each quarter of the udder, which should then be slightly kneaded, so that the air may penetrate by the larger milk ducts, through which the milk drains from the secreting glands of the udder. The operation, which should take place under the strictest sanitary precautions, may have to be performed a second, and even a third time. **Herbert Watney, M.D.**, of Buckhold, Pangbourne, Berks, has perfected the original instrument used, and as the air-injection process when properly applied is of immense importance to the dairy industry of the country, as an almost certain means of saving the best milking animals from a deadly disorder, illustrations of the mechanism with full description in Dr Watney's own words are here introduced from the *Agricultural Handbook and Diary*, 1905.

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[1] This treatment was introduced by Veterinary Surgeon Schmidt, who about 1898 discovered the effects of udder injections, and the relation between the udder and the disease. He used 1 dram of iodide to 1 quart of water.

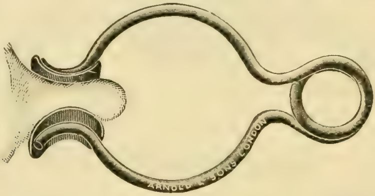

FIG. 38.—TEAT COMPRESSOR TO RETAIN AIR (LLOYD'S).

"This apparatus, Fig. 39 (A), is composed of (A) a small india-rubber bag (with a valve), which can be compressed by hand, and acts as a little air-pump—this pump is connected with a second rubber bag (B), which under pressure can expand so as to equalise the pressure, and which also prevents too much force being used. This elastic bag is connected by the rubber tubing (C) with one nozzle of a metal cylinder (D) into which antiseptic wool is placed—at the other end of the cylinder is a cap (D′) which screws on and off so that the wool can be put in the cylinder—on the outside of the cap is a nozzle, so that by the tubing (E) the cylinder is connected with the hollow milking metal tube (f)—sometimes called a "syphon"—for passing into the teat. The length of the whole is about 4 feet.

"On to the cylinder is attached a hook (D″), so that the cylinder can be hooked on to the inside of a pail filled with water at a temperature of 150° to 160° F., and thus in very cold weather, if the injection is made somewhat slowly, the air pumped into the udder can be somewhat raised in temperature. To prevent any possibility of the cotton wool being pumped into the udder, there is a small contrivance attached to the inside of the screw cap (D′) of the cylinder, Fig. 39 (B).

"This contrivance consists of (g) a small cylindrical piece of metal, part of the screw cap, open at one end to the nozzle and open at the other end towards the inside of the cylinder, *i.e.*, towards the cotton wool; on to this cylindrical piece (g) a circle of silk is placed (i), and this is held down and kept in place by a loose ring of metal (h), which when fitted on and pressed down fits tightly on the cylindrical piece (g). The air follows the direction of the arrows; is pumped through the cotton wool, through the fine silk, and through the rubber tube (E) to the milking tube. The silk is so fine that no cotton wool could possibly pass through it. After use, the screw cap (D′) with the silk and loose ring, the attached rubber tube and the milking tube, should all be placed in 1 in 20 of carbolic acid, then dried and kept ready for use in a glass vessel covered by a perfectly antiseptic gauze."[1]

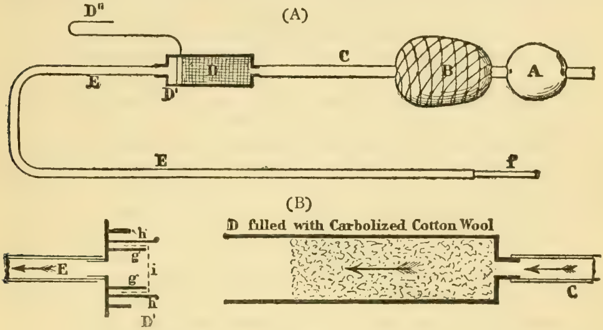

FIG. 39.

Dr. Watney, who has had unique experience of milk-fever in his record-breaking milking herd, writing in 1920, stated that if cows that are heavy milkers are milked out completely and regularly when they calve, or for five or six days after, they are liable to milk-fever. If they are not so milked out, milk-fever very rarely occurs. But cows that are heavy milkers may go down with so-called milk-fever at other times than when calving, as when grazing in a field, or in a cattle truck. This illness seems to be a form of apoplexy. When cows take milk-fever the temperature rises at the beginning, but soon falls below normal. Their horns and ears are cold if milk-fever is coming on. They first stagger, then fall down, afterwards become unconscious and slowly die. In milk-fever injection of air into the udder acts like a charm, *even when the case seems hopeless;* if need be it can be repeated in four or five hours. There are two or more real dangers in the injection: (1) the insertion into the udder of a milking tube which is not aseptic, so that though the cow recovers from the milk-fever, she may afterwards die of a form of blood poisoning; (2) the forcible injection of so much air that the udder becomes inflamed.

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[1] The machine is made by Krohne & Sesemann, 37 Duke Street, Manchester Square, London, W. 1, and costs 30s. It has been used a good deal in New Zealand.

The most acute symptoms of trembling or loupin' ill in cows are much like those of milk-fever, though the cause is quite different. The disease, which is local and infrequent among cattle, is described under "Sheep" at page 744.

Weed, felling after calving, or *adynamia.*—Lean cows often go down and are unable to rise within a few days after calving, if exposed to cold, especially to draughts; and are as helpless as regards ability to rise as those suffering from milk-fever. The great difference of this disease as compared with milk-fever is, that there is no delirium, no pressure of blood on the brain, and the animal often eats and drinks normally, and will even milk heavily for a time. The method of nursing is the same, only part of the treatment is varied to suit the difference of conditions—bleeding, or the application of cold water to the head, for example, being unnecessary. Weed may be altogether prevented by keeping a cow in warm and comfortable quarters after calving, and by covering the back with a rug for a few days. A warm skin from a newly slaughtered sheep in full wool is a favourite means of supplying heat to the back while the animal is unable to rise; and passing a hot smoothing iron over a blanket rung out of hot water is equally efficacious.

Inflammation of the udder, or **garget**, is generally due to the presence of pathogenic germs in the milk-ducts of the mammary glands, although there are various determining causes, such as exposure to cold, bad milking, overstocking, and mechanical injury, as by horning, or the introduction of a dirty milk syphon. "In mild cases there is little constitutional disturbance, the cow feeds and appears to be in good health, but the milk contains little masses of curdled material," and one or more of the quarters of the udder become enlarged, and possibly painful. "Serious attacks are accompanied by shivering, loss of appetite, rapid breathing and pulses, and a very high temperature (107°). The cow straddles her hind legs to prevent pressing on the enlarged udder. The milk is greatly reduced in quantity, and thin, with much curdled matter in it. After a few days it may assume the appearance of pale ale with impurities floating in it. In extremely acute but rare cases mortification or gangrene of the affected quarter sets in with fatal results."

Treatment.—Mild cases are successfully relieved by "frequently drawing the milk, and massaging the affected quarters with a pretty strong hot solution of some reliable antiseptic, such as Jeyes', or Pearson's fluid, or izal—a wine-glassful to 3 pints of water." Lard, goose-grease, or oil may afterwards be rubbed on to prevent cracking. "Poultices are of little practical value, but good results are got from the application of wool soaked with the antiseptic solution and held against the udder by bands over the cow's back. An aperient with ½ oz. of bicarbonate of potash ought, meanwhile, to be administered, and the ½-oz. doses of the potash in water should be continued twice daily for a few days. In all cases of acute udder inflammation, if no improvement takes place on or about the fourth day, resort should be had to an injection up the teats of the affected quarters of a solution of boracic acid, 2 per cent., or of chinosol, 2 grains to an ounce, or other antiseptics."

There is a **contagious inflammation** of the udder observed in some districts. A hard lump appears at the base of the teat, and rapidly spreads till the whole quarter is involved. The milk is early altered, and it assumes the ale-like appearance. This form often spreads to the four quarters, and mostly ends in ruining the bag.

Yet **another form of the disease**[1] attacks cows that have given milk, but are at the time "yeld" or dry. Heifers with fleshy udders, but which have never bred, have been known, but rarely, to take it. It appears usually in or after hot weather in August, one-quarter of the vessel swelling and becoming painful, usually after the animals have been heated by running from flies and probably standing in a draught under the shade of trees or in water. If not promptly treated, two or more quarters may be involved, and a hind limb affected. At times the enlargement extends along the belly and down the fore legs. Death is sometimes the result, and in acute cases, though this is averted, the loss of at least one-quarter of the udder, and from one-third to half the value of the animal.

The Remedial Treatment is to give a dose of salts, rub and foment the udder, and draw the quarter every day until pus disappears. Should the disease be too far advanced for mild measures, or if daily attention cannot be paid, the teat may be either cut off at the neck, or a good opening made with the knife in the fleshy udder close to it. The only subsequent difficulty would be from wound attacks by flies, unless the weather became cold for a few days. This form of the disease may be prevented by rubbing the vessel, at least three times, at intervals of two or three weeks, with a mixture consisting of Archangel-tar, two parts, and butter or grease, one part. By beginning in June, the inducing organisms are kept off, and moreover the tar acts as a stimulant or mild blister, although the grease dilutes it sufficiently to prevent blistering.

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[1] Locally termed in Scotland "udder-clap."

Stocking of the udder may occur, so as to produce a hard painful swelling, and to injure permanently the milking capacity of the animal, when a cow is "miss-mealed" in milking and the udder is gorged and swelled with milk. The object is to induce a purchaser to believe that an ordinary cow is a heavy milker. It is an illegal and dishonest practice and should be severely punished by law. The cow should be milked, and the remedies already described for the reduction of inflammation applied.

Erysipelas of the udder is rather uncommon, and its effects are localised for the most part in the skin of the bag, and of the internal part of the thigh. For this condition a good application is carbolic oil smeared over the bag once a day. Fomentation should not be resorted to. The milk is very little altered, though it is diminished in quantity. The patient is excessively lame, walking with difficulty and with legs wide apart.

Cow-pox, or *Variola vaccina.*—This is an infectious and contagious disease of cows. The malady is a very mild one, the constitutional disturbance being almost negligible, and consisting of slight febrile symptoms. An eruption of nodules occurs on the teats and on the udder at the base of the teats. Later, these nodules swell, and fluid being poured out, vesicles form which may dry up or, the contents getting purulent, develop into pustules which burst and discharge and get covered by scabs. These are rubbed off in milking and leave oval sores. The disease is usually started by milkers who have been recently vaccinated. The belief was long held that persons contracting cow-pox were immune to smallpox, and it was by demonstrating the truth of this belief that Jenner obtained undying fame. Having a number of patients to inoculate for smallpox, he first gave them cow-pox and then found that his smallpox inoculation would not "take."

Impaction of the rumen or first stomach is not uncommon when cattle are in poor condition and the functions of digestion consequently weak. It may be caused by unsuitable food, as when cattle are fed solely on cut straw and pulped roots; when much use is made of dry, concentrated, rich food such as cotton-cake or bruised grains; or it may occur when cattle are turned out to benty land on the hills in spring before young grass has begun to grow. The rumen may not be much enlarged, but on pressing, it has a soft and doughy feeling.

Treatment.—A strong purgative must be given, except in the case of weak cattle, preferably Epsom salts and aloes, and the side of the paunch should be kneaded to try to break up the mass of undigested food. Withhold bulky food, and support the animal with gruels, which digest without being cudded like long food; give stimulants, such as ½ oz. to 1 oz. of carbonate of ammonia, and repeated doses of raw linseed oil, castor oil, or treacle, to keep the bowels open.

Persistent impaction may be caused by something hard lodging in the stomach, such as a piece of old shoe leather, which animals sometimes pick up and chew. This can only be got rid of by rumenotomy, *i.e.*, cutting a hole into the stomach on the left side, removing the foreign substance, and following up by giving little food for a few days until the wound heals.

Choking is most frequent when cattle are fed on whole potatoes or small turnips. If an animal is permitted to elevate its head, a piece of the unchewed root is liable to slip over the throat and to lodge in the gullet, which spasmodically closes before it, and the proverbial "lump in the throat" becomes a dangerous reality. A "probang" is not a safe means of relief unless in skilled hands, the gullet being so easily ruptured when force is applied. The most simple and effective practice is to keep the mouth open by introducing a wooden gag like a large bit, to prevent the collection of gases in the stomach, and to avoid choking by saliva, which then runs from the mouth in place of into the windpipe; a little oil and sulphuric-ether, sufficient to lubricate the part, may also be given with advantage. To drench a choking animal with salt and water is a barbarous and dangerous practice (although the violent coughing which is set up may help to relax the muscular contraction of the gullet), as, the gullet being closed, the solution must find its way into the windpipe and bronchial tubes, and produce great irritation and discomfort, if not organic disease. Choking may be prevented by keeping down the heads of the animals while they are feeding on roots in their stalls, by letting drop on the back of their necks a long pole, about 3 in. in diameter, hinged to and suspended from the rail binding the upper ends of the stakes to which the cattle are tied. Death in cases

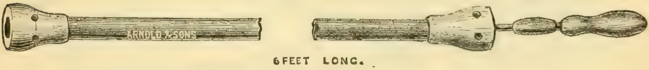

FIG. 40.—CATTLE PROBANG: SPIRAL WIRE IN LEATHER.

of choking is usually due to over-distension of the rumen by gases, which form there and cannot escape by the usual means of eructation. The distended rumen, pressing on the diaphragm, presses on the lungs and causes asphyxia. When death is imminent the rumen ought to be at once punctured. See "Hoven," p. 356.

Foul in the foot is not unlike foot-rot in sheep, in which abscesses form in the foot and sloughing of the horn and adjoining structures occurs. It is most common in the hind feet, and the animal grows feverish and loses condition, becomes very lame and stands with its claws apart. The causes are, irritating bodies between the digits, an animal grazing on low, soft, marshy pastures, or standing in wet and filthy gateways. *The treatment* is to poultice, in order to remove inflammation and draw pus, and then follow by dressing the foot with an astringent lotion, consisting of equal parts of butter of antimony and tincture of myrrh, and binding it up with tow and tar. Foul in the foot is not uncommonly tubercular in its origin, and then is a progressive disease that can only be treated by amputation at the coronet.

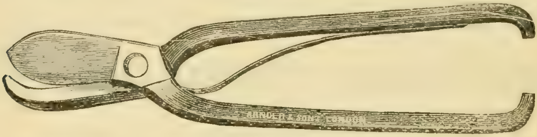

FIG. 41.—HOOF-CUTTER WITH SPRING.

Other lamenesses are produced by casual injuries, by something hard, such as a small stone, picked up and fixed between the digits, or by scalding in wet seasons. A hind leg can be held up for examination and treatment, by a man on each side standing close to the cow, lifting the limb by means of a smooth stick, about the length and strength of a one-horse whipple-tree, placed across between them in front of the animal's hock. A strip of strong canvas, drawn backward and forward between the claws by the operator standing behind, should be used to clear away all dung, earth, or other foreign matter which may have lodged there, to admit of a thorough examination of the part, and to prepare for a caustic mixture, or some other stimulating dressing, which should then be applied by means of a thin splinter of wood. Cows or bulls which are not allowed much exercise, become lame through the hoofs not being naturally worn by walking, so that they grow long and turn up at the toes. The overgrowth of horn may be removed by sawing, followed by using a pair of long-handled powerful shears for dressing or finishing, or by a chisel and mallet.

Swellings on the hind legs, and lameness, occur among heavy cows tied in stalls which are not bedded with litter, from injury usually about the hocks, due to pressure and irritation produced by lying on cold bare stones. Enlarged knees from watery accumulations also result from lying on a hard floor, especially if the surface be uneven from projecting points. *Remedial treatment* of the knee consists in cutting through the skin near the lower edge of the swelling to allow the fluid to drain off, and to get the forefinger in to extract coagulated material, which requires to be removed before normal conditions can be restored. A cow at pasture must be kept in the house for a few days after the operation till the smell of blood goes off, else her neighbours are liable to attack her in obedience to the natural instinct of animals to become excited and kill members of the herd that come by serious injury. A seton dressed with equal parts of turpentine and oil passed through the swelling on the knee may be efficacious. A strip of fibre matting[1] or some common form of litter is a complete protection for the knees. Cows thrive and milk best when means are taken to prevent them lying on bare floors, which draw heat from the body.

Mange in cattle is a parasitic affection due to the presence of one or other of three species of *Acarus* (mites) *A. sarcoptes*, *psoroptes*, and *symbiotes*. The different forms of mange are consequently named "sarcoptic," "psoroptic," and "symbiotic."

Sarcoptic mange is almost unknown in this country, but it was discovered by W. R. Davis, M.R.C.V.S., in 1896 (*Veterinary Journal*, February 1896), and his diagnosis was confirmed by Professor A. Railliet, Alfort Veterinary College, Paris. It is reported to be present on camp cattle in Argentina and on the range cattle of the Canadian North-West, and it forms one of the diseases which the existing restrictions against the importation of live cattle into the United Kingdom have the credit of excluding from the herds of this country.

The psoroptic and symbiotic forms are common among milch cows, and frequently exist together.

Mange appears mostly about the root of the tail, on the neck and withers, and, when neglected, the psoroptic form may become generalised and spread all over the body. Symbiotic mange is of little gravity, and is usually located on the hind pasterns and at the root of the tail. The hair is liable to be rubbed off the itchy parts, and red and yellow scurf appears on the skin. Animals in low condition from milking heavily, or from the presence of a lingering disease like tuberculosis, are most susceptible. Fat cows and those thriving quickly on fresh grass in spring so reduce the attack that it may not be observable; but, unless they are thoroughly cleaned, they harbour a sufficient number of the parasites to account for the reappearance of the affection in autumn when the cattle are housed.

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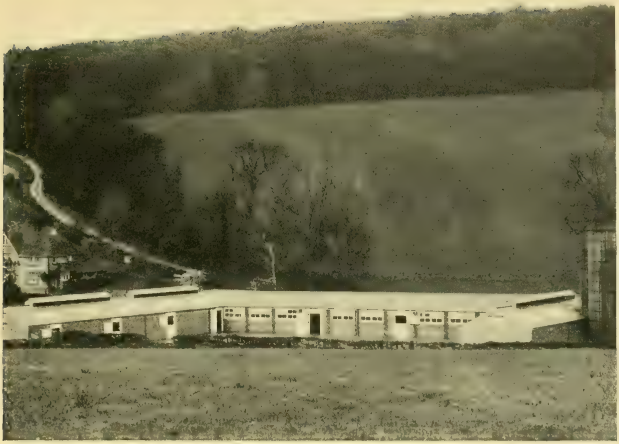
[1] Matting must be regularly beaten and exposed to fresh air, else parasitic infection of the fore feet is liable to occur.

Sarcoptic mange of cattle affects the same parts as the other forms of mange, but readily spreads more widely and has a much more pronounced action on the skin, which becomes thickened, cracked, and wrinkled.

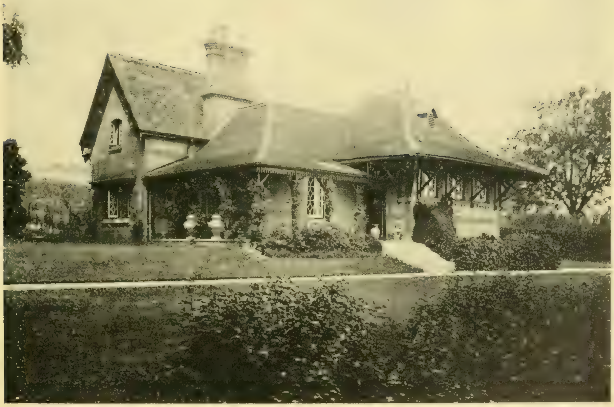
Treatment.—The affected parts should be clipped, the hair burnt, and the skin thoroughly disinfected.

> "The animal should then be well rubbed all over with soft soap, to which a small quantity of creolin may be added," followed after a lapse of several hours by a thorough dressing with one or other of the following preparations:—(1) Oil of tar 1 part, linseed oil, 20 parts, with as much flowers of sulphur as the mixture will incorporate, heated gradually to near the boiling point, and, when cooled, rubbed well into the skin, there to remain for some days before being washed off and another dressing put on; (2) Helmerich's pomade, consisting of sublimed sulphur 200, potassium carbonate 100, and lard 800, applied as described, but not smeared over too great a surface at one time to avoid suppressing the skin functions; (3) Creosote 10 parts, alcohol 10 parts, with 25 parts of water, or creosote 1 part, and vegetable oil 30 parts; (4) Zundel's formula = crude carbolic acid or creolin 53 oz., quick lime 36 oz., carbonate of soda 107 oz., soft soap 107 oz. dissolved in 57 galls. of hot water (coal oil and benzine, although effective, often produce persistent skin irritation); (5) kerosene emulsion, consisting of hard soap ½ lb., water 1 gall., kerosene 2 galls.—the oil and soap put in when the water boils, and constantly stirred till cool, and then dissolved in 60 galls. of hot water.—Report on Mange, J. G. Rutherford, V.D.-G., Ottawa, 1904.

The stalls and surfaces touched by affected cattle must be thoroughly disinfected with crude carbolic and limewash.

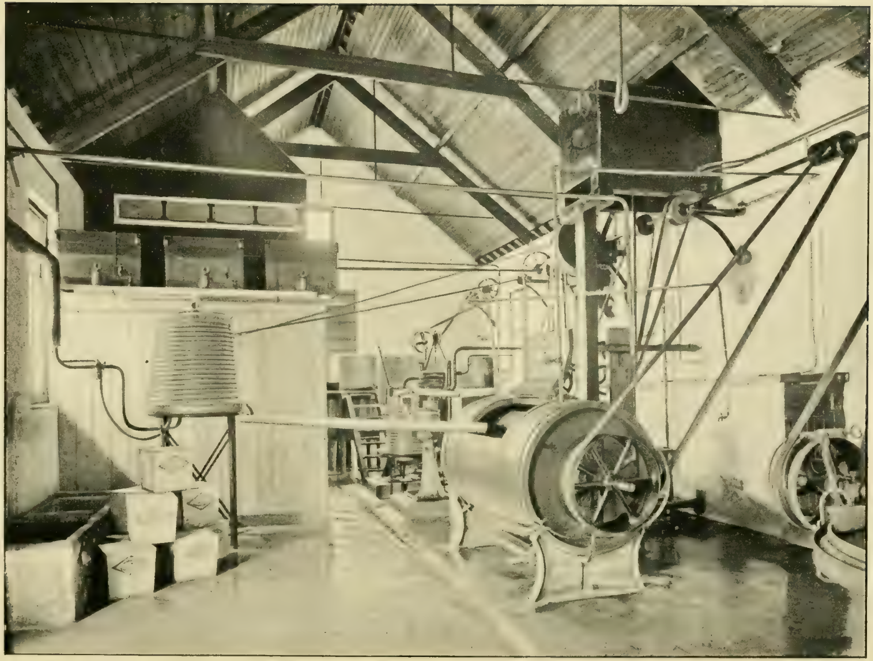


A. MODEL COW BYRES AND SILO
Erected by Holt Thomas, North Dean, Bucks.
[*J. T. Newman, Berkhamsted.*

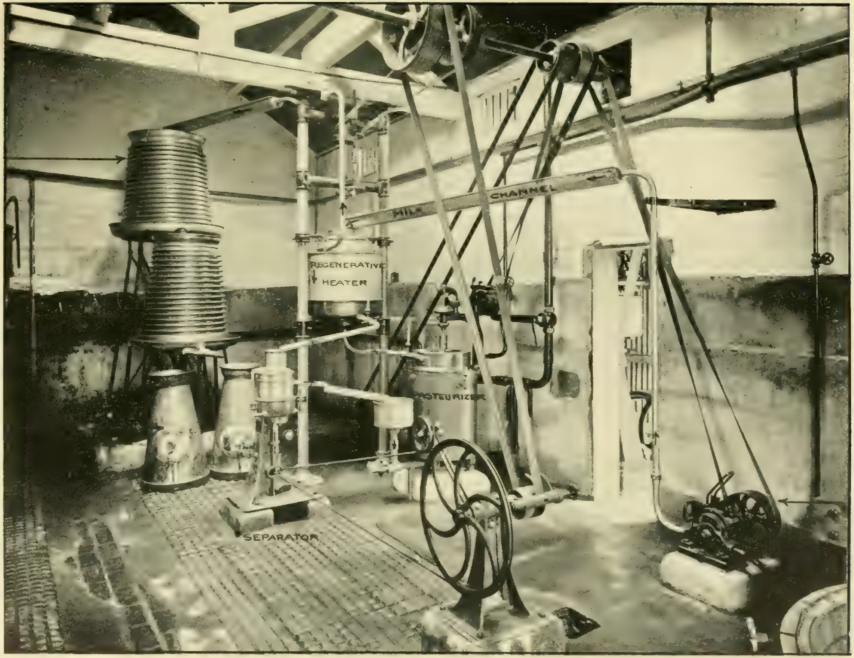


B. MODEL DAIRY OF LORD ROSEBERY at Mentmore, Bucks.
J. T. Newman, Berkhamsted.

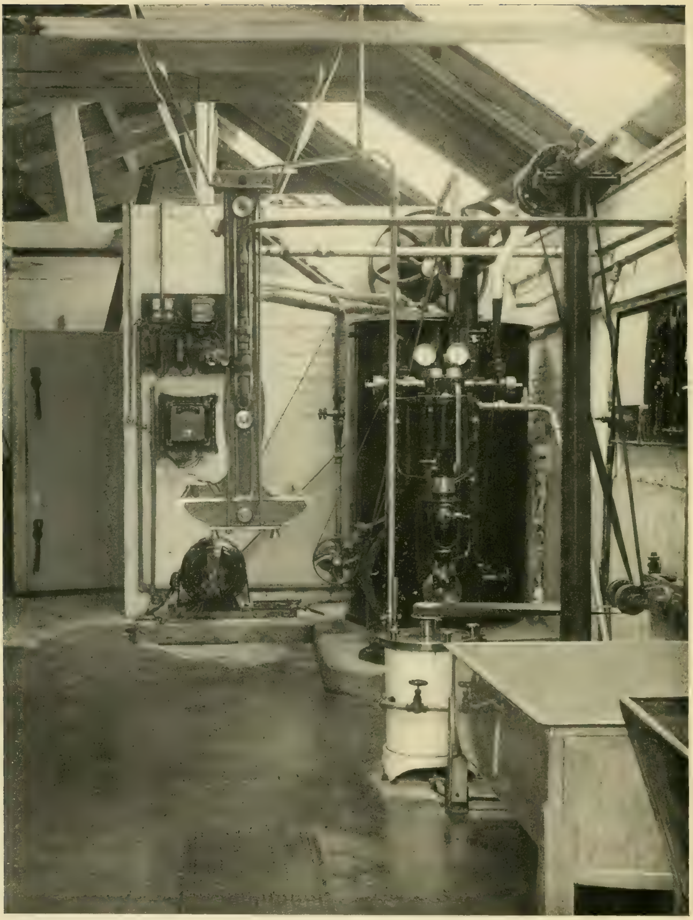
PLATE LXXXII.



INTERIOR OF IRISH CREAMERY.
(Pasteuriser, Separator, and Coolers at back wall).



View of a London Dairy.



1. Interior of Modern Town's Dairy,

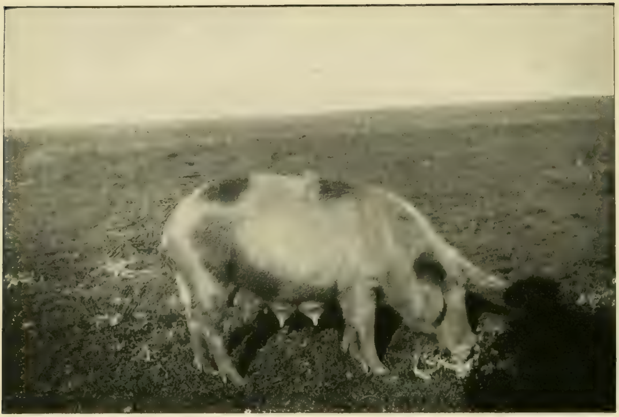
Showing in the corner a Refrigerating Machine which is connected up to a Vertical Cooler; also an Electric Motor driving a Refrigerating Machine; and in the foreground Pasteuriser and Milk Receiver with an Insulated Door, open, where the milk is stored after being cooled.

With acknowledgments to Lowdon M'Queen Douglas, 27 West Savile Terrace, Edinburgh, for this and the originals of the two foregoing plates.

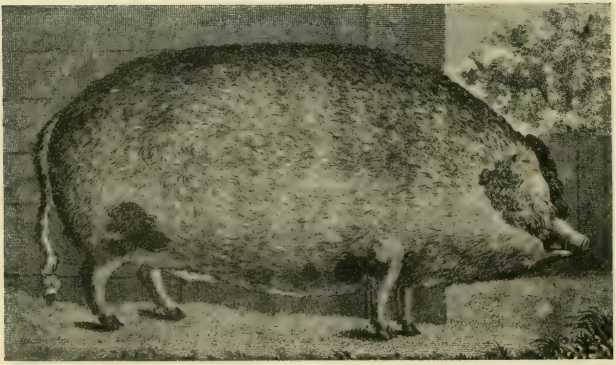
A. A WILD BOAR AT BAY, from a specimen of Japanese Art belonging to S. Williamson Wallace, Kelton, Dumfries. (See Appendix K.)

B. WILD BOAR AND SOW, *Sus scrofa*, from Portugal.

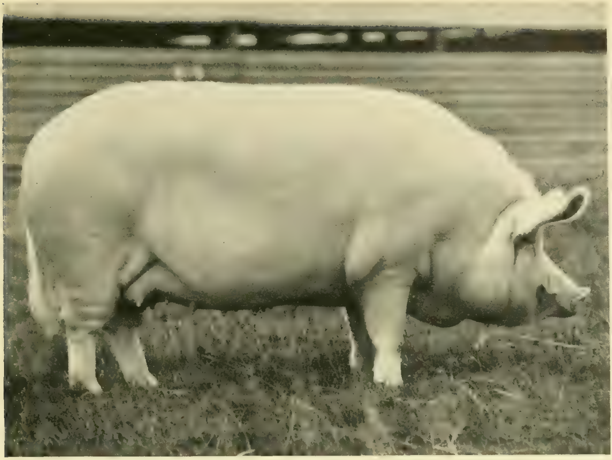
[*From a painting in the Low Collection, University*] *of Edinburgh*.



A. ARGENTINE CAMP SOW, with black skin under its white as well as its black hair.

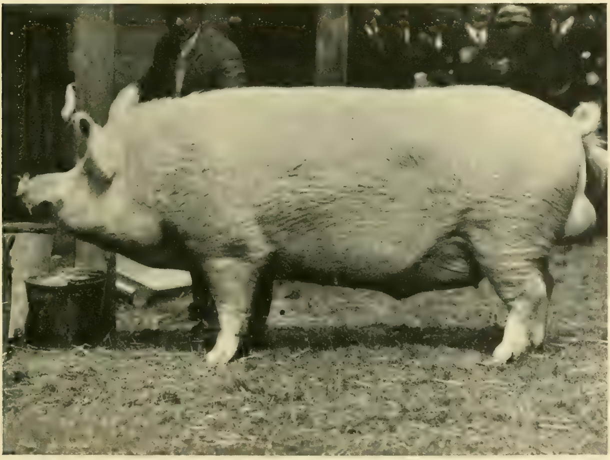


B. THE LARGE GREY SCOTCH HOG (Extinct).
From the frontispiece of Robert Henderson's TREATISE, 1st Ed., 1811. See p. 414.



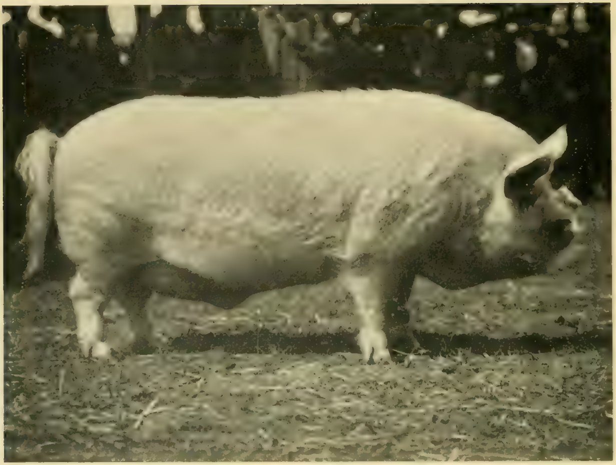
A. Large White Sow, "Broxburn Sweethope." Aged 1 year 5 months 10 days. First at Highland Show, 1921. Owned by J. D. C. Frame.

["*Agricultural Gazette Photograph.*"



B. Large White Boar, "Spalding Wonder 6th." Age 3 years 6 months 18 days. First and Breed Special at Highland Show. Owned by The Earl of Rosebery.

["*Agricultural Gazette Photograph.*"



A. Middle White Boar, "Wharfedale Deliverance."
Gold Medal and Champion at Cambridge Royal, 1922.
[*"Agricultural Gazette Photograph."*

B. Middle White Pigs in the Woodlands Chetten Mills. J. Timberlakes, Hastoe Farm, Tring.
[*J. T. Newman, Berkhamsted.*

CHAPTER XVIII

PIGS[1]

Pigs—The European Pig, *Sus scrofa* and the Chinese Pig, *Sus cristatus* (*indicus*)—The Wild Hog, *Sus scrofa* (*aper Bris.*)—The National Pig Breeders' Association, and other Societies—General Show Points of Improved Breeds—The Bacon-curer's Pig—Changes in Feeding and in Curing—Rolled Bacon—Distinguishing Characteristics—**White Breeds**—Large, Small, and Middle Yorkshires—Lincolnshire Curly Coated—The Cumberland Pig—Old Glamorgan Pig—Old Welsh Breed—The Long Lop-eared Devonshire White—The Large White Ulster—**Dark Breeds**—The Large Black—The Berkshire—The Tamworth or Staffordshire Breed—**Belted Breeds**—The Essex Pig—The Wessex Saddleback—**Spotted Breed**—The Gloucester Spot—**Robert Henderson** on Pigs in the early Nineteenth Century.

PIGS are divided into two groups — *Sus scrofa* and *Sus cristatus* (*indicus*). The latter, or Chinese pig of several types, is by far the more improved (refined) of the two, from the modern breeder's point of view. The *scrofa*, the European pig, is sprung from and resembles the wild boar. As compared with the *cristatus* type, it is longer, leaner, narrower, coarser in bone, in hair, and in every way: the nose is longer and the forehead narrower, but these defects in form are correlated with greater activity and a hardier constitution.

Although it is the fashion to use these classifications, there is no doubt but that all pigs that breed freely together, of whatever colour, size, and form, must have originated from one common stock, and had for a common parent the Wild Hog, *Sus scrofa*, which possessed a wide geographical distribution, being indigenous to Europe, Asia, and North Africa. The savage little grey-collared Peccary, *Dicotyles labiatus* (of South American origin), with its dorsal musk gland, and curved trenchant teeth comes in.

Sanders Spencer refers to the **Wild Boar** of Europe "as of a russety-grey colour when young, deepening as the pig reaches maturity, and becoming a dark chestnut-brown, with its hairs tinged with grey at the extremities as old age crept over it." The shade is darker in hot than in cold countries, and even the descendants of pigs which have broken loose from domestication become more russety or slate-coloured in the tropics than in temperate climates. In the Argentine the Camp Pig, not descended from modern imported blood, has a dark or black skin, except under the belly, even although (as in Plate LXXXVI. A) the greater part of the body is covered with strong white hair. **The Wild Boar** is an extremely active, and, when roused, dangerous animal. It is not long since specimens of it were preserved in some of the enclosed parks of this country. Wild pigs in Chartley Park were so nimble that they hunted rabbits as successfully as a terrier dog.

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[1] For a list of the *Herd Books* see Appendix A., "Pigs." See Bulletins Nos. 47 (Parts I., II., and III.), 69, and 77 (Part III.), U.S. Department of Agriculture, Bureau of Animal Industry.

According to **Dr Munro** the wild boar was exterminated in Scotland about the middle of the sixteenth century, but J. E. Harting has shown that he still existed in Oxfordshire in 1572 and in Staffordshire in 1593.

"**The Wild Pig of India** (*Sus indicus*) is known by Englishmen in the Bombay and Madras Presidencies as the 'hog' (deriv. Welsh, *hwch* ; Breton, *hauc'ha*, to grunt), while in Bengal and Northern India he enjoys the more common title of 'pig.'

"To describe him generally, he is an animal of low and powerful build, standing from 28 to 36 in. at the withers. Head long and narrow and carried low, with a short thick neck; the back and limbs particularly muscular. The top of the head and neck, the throat, withers, and rump are covered with long brownish-grey bristles, and the rest of the body with shorter hair of the same description ; tail straight and tapering, with tag of bristles at the end. The male is armed with two tushes on the lower jaw, tapering, sharp, and pointing upwards, and two shorter and thicker in the lower jaw, also curling upwards. These, in conjunction with his small, yellowish-red eyes, deep set in his head, give him a particularly wicked appearance, which does not belie his genuine nature.

"The character and size of the 'pig' vary much according to locality ; for instance, the species found in Afghanistan is more like the European boar (*Sus scrofa*) in general appearance, being large-headed and heavy shouldered, with a particularly thick growth of bristles, and an undergrowth of woolly hair." (See Appendix K.)

"**The hog** occupies a remarkable position among domestic animals. It is like the horse in the number of its teeth and the length of its head and in having but a single stomach ; like the ox kind in its cloven hoofs, and the position of the intestines ; and like the claw-footed animals, as the lion, the cat, and the dog, in its appetite for flesh in a restricted sense, in not chewing the cud, and in having a numerous progeny. In a natural state, it feeds chiefly upon roots and vegetables ; it seldom attacks any other animal, being content with such provisions as it can procure without danger. Animals that die in the forest, or are so wounded that they can make no resistance, become a prey to the hog, who seldom refuses animal food, however putrid, although he is rarely at the pains of taking or procuring it alive. Though, in the domestic state, it seems the most sordid animal in nature, devouring indiscriminately everything that comes in its way, yet, in its wild state, it is of all other quadrupeds the most delicate in the choice of what vegetables it shall feed on, and rejects a greater number than any of the rest."

Improved pigs here are divided into five classes—the black, the white, the red or chocolate, the belted, and the spotted.

The great divergence in colour in stock of one descent was no doubt due to the results of an inherent tendency to changes aided at first by the influence of environment, and in recent times by the artificial selection of breeders following their fancy, fashion, or so-called work of improvement. The modern Berkshire is a striking illustration of a breed being fundamentally changed in colour in less than two human generations.

THE SCALE OF POINTS, DEFECTS, AND DISQUALIFICATIONS.

The following **scale of points** may be taken as a type of those applicable to the leading British breeds:—*Colour*, according to breed, 10; *head*, moderately short, wide between the ears, 4; *ears*, thin and fringed with fine hair, 3; *jowl*, small and light, 2; *neck*, not too long but muscular, 3; *chest*, wide and well let down, 5; *shoulders*, oblique and level on top, 4; *girth*, around the heart, 4; *back*, long and straight, 5; *sides*, deep, 5; *ribs*, well sprung, 4; *loins*, strong, not drooping, 2; *belly*, full and thick, with at least 12 teats, 3; *flank*, thick and well let down, 2; *quarters*, long and wide from hip to tail, 6; *hams*, broad, full, and meaty to the hock, 8; *tail*, set high, not coarse, 2; *legs*, straight and with flinty flat bone, 5; *ankles*, strong and compact, 3; *pasterns*, short and yet springy, 3; *feet*, firm and strong, 2; *evenness*, freedom from wrinkles on skin, 14; *coat*, fine and long, 3; *action*, strong, 4; *symmetry*, general style and contour, showing evidence of careful breeding, 4; total points, 100.

Defects that are objections in pigs of all breeds:—*Forehead*, narrow; a too long or too short pug *nose; ears*, thick, coarse, defectively coloured or wrongly inclined; *jowl*, fat and full; *neck*, short and very thick and fat; *chest*, narrow, with both fore legs apparently coming from almost the same point; *shoulders*, coarse, heavy, or wide and open on the top; *girth*, light round the heart, and *fore flank* light; *back*, weak and hollow when the pig is standing at rest; *sides*, shallow, not well let down between the fore legs; *ribs*, flat or short curved; *back rib*, light; *loin*, narrow and weak; *belly*, flaccid, or wanting in muscle, or pot-bellied, or podgy; *flank*, thin, and not well let down; *quarters*, short, narrow, or drooping; *hams*, narrow, wanting in depth, or deficient in muscle in second thigh; *tail*, coarse and set on low; *legs*, crooked, weak, and with round and coarse bone; *ankles*, extra large, round, and weak; *feet*, flat, splayed, and extra wide or large; *unevenness*, wrinkles on sides, neck, or shoulders; *coat*, coarse, curly (with exceptions), bristly, or "maney," with fringe along the top of the neck and shoulders; the *hair*, when too hard and strong, indicates want of breeding; a thick skin; coarse offal—slow feeding; when not abundant, or weak and soft (especially in the boar)—want of constitution, probably the result of too close in-breeding; which leads also to the progeny becoming small, weak, uncertain breeders, and liable to scrofula and other diseases, as well as to the loss of the tail, if the animal escapes being deformed or still-born; *action*, sluggish and clumsy; *symmetry*, predominance of certain points, especially heavy shoulders or fore quarters generally, with weak loins and light hams. **Disqualifications**:—Wrongly coloured hair; in boars, rupture, or one testicle only down; in sows, deficiency in, or very irregularly placed or blind teats; injured or diseased udders.

The white breeds probably prevailed in Scotland and the north of England; the blacks in southern England. Between the two, in central England and Wales, were to be found the russet colours and combinations of the three colours, including belted and spotted breeds. All have been improved by crossing the native *scrofa* pigs with specimens of imported *cristatus* (which is not, however, so prolific), and by selection. The Berkshire and Essex breeds, for instance, were improved before the middle of the eighteenth century by the use of a number of imported pigs belonging to a black Italian breed, the Neapolitan—which had been dashed with *cristatus* blood.

Improved breeds possess a much greater tendency to fatten, and they have more symmetrical forms; but they are not so active and hardy in constitution as the older kinds.

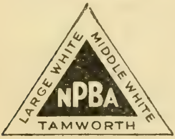

Fig. 42.

Porcine interests in Great Britain and Ireland are mainly under the fostering care of the various **Pig Breed Societies** as well as:—

The National Pig Breeders' Association, formed in 1886, which has developed into one of the largest Pig Breeders' Societies in this country, having in 1922 (April) 1575 members.

This Association, the only one in England that issues particulars and records pedigrees of more than one breed of pigs, controls the activities of the large white, middle white, and Tamworth breeders. In 1922 thirty-eight *Herd Books* had been published: with a record of 8263 entries in 1921.

The first **Show and Sale** was held at Birmingham on 14th October 1920. "There were 200 entries, and satisfactory prices were realised, the net proceeds amounting to £6525. The championship in the large white section was won by a twenty-months-old sow, exhibited by Sir Gilbert Greenall, Bart., which was sold for 230 guineas, the highest price of the sale. Other first prize winners in this section were E. Wherry, of Bourne, and A. W. White, Spalding. The champion of the middle-white breed was a sow rising four years old, exhibited by L. C. Paget, York, and bred by the Earl of Rosebery at Dalmeny House. First prizes were taken by J. Chivers, Histon, Cambridge; the Misses Bailey, Bridgnorth; and J. H. Holland, Folkestone. For Tamworths, the principal honours went to R. Ibbotson, Knowle, Warwickshire."

Auction Rules of the N.P.B.A.:—With the object of precluding the collusive transactions which sometimes obtain at public auctions, the National Pig Breeders' Association has drawn up a set of rules as follows:—

The catalogue shall state the date of previous farrowing and of the last service, together with the name and registered number of the boar.

Where the entire herd is to be disposed of, every registered animal in the vendor's herd is to be offered, except in special circumstances approved by the Association. The vendor shall not bid directly or indirectly for any animal not plainly stated in the catalogue as offered subject to a reserve price; nor shall the vendor withdraw any animal catalogued, except for good reason established to the satisfaction of the auctioneer.

It will be a breach of the rules if, at any time within six months, any animal sold shall be upon the vendor's premises or exhibited at any show in his name, except for approved reasons. The auctioneer must furnish to the secretary of the Association, within one week after the sale, a catalogue signed by him and the vendor showing the highest bidding for each animal offered, with the full name and address of the purchaser.

If the vendor commits or knowingly suffers any breach of these rules, he will be liable to be removed from the Association. It must be stated that the sale is to be held under the N.P.B.A. auction rules. Any dispute may be referred to the Council for settlement by arbitration.

Points generally applicable to all Breeds.

(*Showyard standard.*)

In judging, it is best to begin at the feet and legs, as these are most important, on account of their having to carry the weight when the animal is fat and heavy, and to insure firm, free action. The *feet* should be proportionate and neat; the *pasterns* strong; the *legs* perfectly straight and well set, level with the outside of the body, with fine flat bone, fleshed well down in both fore and hind quarters; *feet* wide apart; *loin* strong, and as broad as the *shoulder-head*, which should be compact and free from any opening or looseness; the *back* broad all the way, straight and level, not drooping too much at the *rump* when the animal walks, and extending over the neck. Pigs are all liable to arch in the back and droop at the rump when standing. The *under line* should be parallel with the back, and continued below the jowl; the *chest* wide and deep; the *belly* full, but not flabby; the *quarters* long and wide, and straight from hip to tail; *hams* broad, full and deep to hocks; the *flank* thick, full, and well let down; the *ribs* well sprung, and *sides* deep; the *neck* thick, especially towards the shoulders, and of proportionate length; the *ears* varying from a foot long to a few inches, each breed having its own special size, shape, and position; the *head* broad between the eyes; the *nose* long or short, according to breed; the *under jaw* shorter than the upper; the *cheeks* full; the *eye* not too small, quick, but mild; the *tail* stout and long, and set high, but not coarse, and a tuft of long fine hairs on its tip; the *body* well covered all over with flesh, and of a rectangular shape from all points of view, deep and wide before and behind; the *skin* medium in thickness, and covered with a sufficient *coat* of characteristic *hair*.

Though the points enumerated are those looked for at shows, it has been pointed out chiefly by breeders and exporters like Sanders Spencer,[1] and also by those interested in the bacon-curing trade, that the most economical pig to breed, and consequently the one which ought to be encouraged in the showyard, should be long in the body, a good medium depth in the ribs, light in the neck and fore quarters, and heavy and deep behind in the hams or gammon; or, as Sir A. W. Shaw of Limerick has tersely put it: "What is really wanted, is a pig that is neat in the head, light in the neck and shoulders, deep in the heart, thick in the loin, stout in the thighs, and short in the legs,"—the reason being that changes in the curing trade and pork market have resulted in certain parts of the animal being of greater value per lb. than other parts, as will be seen from Fig. 43 (page 383), after an original diagram exhibited by Sir A. W. Shaw. The shoulder and neck being of least value, it is a waste of food to transform them into flesh of inferior quality, if by selecting animals with tendencies to greater development in the more valuable parts, a greater amount of material on the higher division of the scale of market values can be produced.

A great change has come over the system of feeding pigs, as well as of curing their carcases. A generation or more ago it was the custom to kill pigs about two years old, at enormous weights, after the flesh had become coarse. The method of curing left the lean portion gorged with salt, hard, indigestible, and uninviting: then it was an advantage to have a large proportion of fat to lean. Now, however, the system of mild-curing renders the flesh sweet and juicy, and all efforts are directed towards the production of as great a proportion of lean to fat as possible. The large increase of the consumption of fresh pork has also encouraged the demand for young, lean bacon; and, on the other hand, the change of fashion which has put young and tender pork on the market has helped to increase its consumption.

The ideal type of animal for these purposes, of whatever

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[1] Paper read at the Irish Conference of the British Dairy Farmers' Association, May 1887, by S. Spencer, Holywell Manor, St Ives.

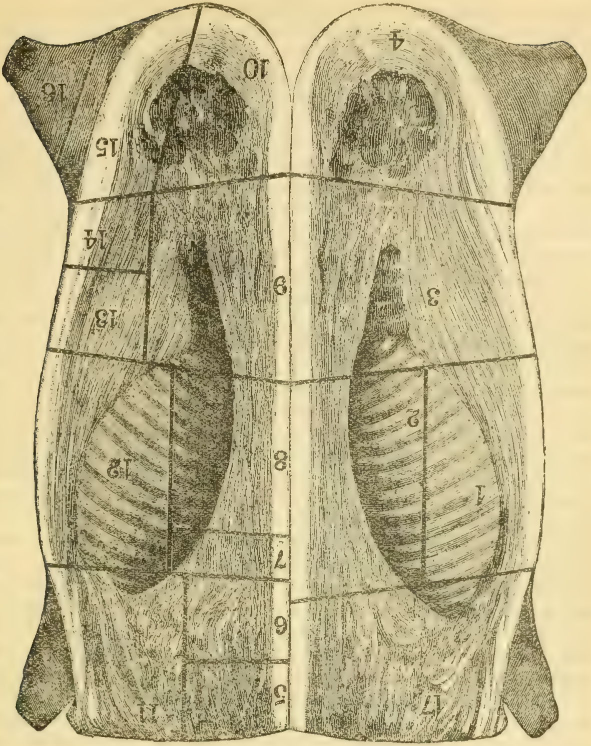

FIG. 43.—MODEL SIDES OF BACON.

1.	1.	Streaky Quarter.
	2.	Rib Quarter.
	8.	Prime Back and Ribs.
	12.	Prime Streaky.
	15.	Middle of Gammon.
2.	7.	Thick Back and Sides.
	9.	Loin.
	10.	Fillet.
3.	3.	Middle Quarter.
	4.	Ham Quarter.
	6.	Middle of Neck.
	13.	Thin Streaky.
4.	11.	Shoulder.
5.	5.	End of Neck.
6.	16.	Knuckle of Gammon.
7.	14.	Flank.
8.	17.	Fore-End.

Reproduced from the paper mentioned in footnote, p. 382. The parts or cuts are named in order of value. Prices, which fluctuate, are omitted.

American pork or bacon may be known by the roots of the hairs or bristles being arranged in groups of two or three hairs together, while the hair on the skins of pigs reared in the British Isles is more regularly distributed.

breed of pig, is well described in a recent Bulletin of the University of Illinois.[1] It is the type which originated in Great Britain, Denmark, and Canada, and is being adopted in the United States as a result of the systems of breeding and feeding adjusting themselves to market requirements.

"A hog of this type must be long in body and deep in side, with comparatively narrow back, light and narrow hams and shoulders, and light, muscular neck. This form is desirable because it is the side of the hog that furnishes the best and most expensive cuts, and it is necessary to have as much as possible of this at the expense of the other parts. This hog must also afford indications of having firm flesh, must be well covered with lean meat or muscle, and must not have an excess of fat on the outside of the carcase. The fat on the outside should not be more than 1 in. to 1¼ in. thick, and should be evenly distributed over the entire carcase. The weight must be between 160 lb. and 200 lb., in order to afford the most desirable cuts as to size, firmness, and flavour. A hog smaller than the specified weight would furnish a side of bacon too thin, and one larger, a side too thick. A hog old enough, that with good care and breeding will weigh from 160 lb. to 200 lb., furnishes the best-flavoured bacon. A hog lighter than this would probably be too young, and one heavier than this too old, to yield bacon of the best flavour. In firmness of flesh, also, the bacon hog of 160 lb. to 220 lb. is likely to be the most desirable. A hog younger than is required to produce this size would have too much water in its flesh, for the younger the animal the more water it has incorporated in its system; and this excess of water not only detracts from the firmness of the flesh but reduces the food value, because the meat has less 'substance.' When a hog is heavier than 220 lb. he is not so good for bacon purposes, because when over the age required to produce this weight, there is a greater tendency to lay on fat, not only on the outside of the carcase, but intermixed also with the lean meat, thus producing too much fat in proportion to lean meat for the best bacon. After this age there is, moreover, an increased tendency to lay on fat unevenly and in patches; where this occurs it is impossible to produce good bacon."

According to the latest available **statistics**, hogs of the known or scheduled parts of the world number a grand total of 150 millions. The United States is credited with 72 millions; Germany, 14 millions; Russia (1914), 14 millions; Hungary,

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[1] Reviewed in the *Times* of 17th April 1905. Bulletin No. 10 of The Department of Agriculture (Branch of the Live Stock Commission), Canada, on *The Production of Bacon for the British Market* (December 1905), also deals very fully with the subject.

7 millions; Great Britain, 2½ millions; Ireland, 1 million; Canada, 4 millions; and Spain and France, 4 millions each. In the Western States of America, including Ohio and Kentucky, which constitute the great maize-growing region (the centre of the densest hog population in the world), the numbers of hogs "packed" in one year exceeds 25 millions; to this, some 3 millions packed in the Eastern States have to be added. But the total killed per annum for all purposes is more than double these numbers combined, as it is estimated that "16 per cent. more pigs are killed in a year than are enumerated at a particular date in the year, the average duration of a pig's life being less than twelve months." **Butchers' hogs** form an important item. They are chiefly "barrows," in greater request at higher prices than sows, the best of which are kept for breeding. The fresh-meat trade absorbs most of the butchers' hogs—about one-fourth of the hogs sold in the stockyards of Chicago (the largest daily hog market in the world) belong to this class, and the best-fed variety ranges in age from six months for light to twelve months for heavy weights. The majority of American pigs, which are fed almost exclusively on maize, belong to the excessively lardy or all-fat kind, which the packing trade has developed, but which will in future have to share public favour more equally with the lean-meat varieties.

"The type of hog reared in the United States is unlike the bacon hog of England, Denmark, and Canada, in that the most valuable parts of the American hog are the hams, back, and shoulders. It consequently happens that these parts are developed at the expense of the sides, the result being an animal differing in essential details from our own bacon pig—for the former has a broad back, wide and full hams and shoulders, with heavy neck and jowls, and a large proportion of external as well as internal fat. Most of the swine of the United States are reared in the 'corn belt'—that is, the zone in which the cultivation of maize is chiefly pursued. This section of the country has consequently taken the lead in the development of swine of the fat or lard hog type, and has determined their characteristics. When the United States were settled, swine were, of course, taken over from Europe, and they have undergone gradual modification to suit the climatic and other conditions peculiar to the corn belt. Three principal reasons have influenced the development of the fat or lard hog—(1) the abundance and relatively low price of maize; (2) the American home demand for cured meats; (3) the foreign demand for cheap meats. The fat or lard hog of the United States thus came to be produced, not only because he could be reared more cheaply than the bacon hog, but because there was a demand for just such an animal."

"Bacon hogs, as their name indicates, are used for the production of bacon—that is, pork that has been salted and then smoked. The hams and shoulders are sold separately from the carcase. Much of the 'English bacon' is cut into what is called a 'Wiltshire side'; this is the whole side, with merely the head and feet cut off. The bacon hog that is representative of this class belongs primarily to Great Britain, Denmark, and Canada. This hog has been introduced into the United States, and is rapidly establishing for itself a market class."

The scarcity and growing dearness of hog's flesh has in recent years led to the extension of the hog-rearing industry beyond the corn belt, into the wheat-growing areas, where pigs are now successfully grazed in increasing numbers on alfalfa and other leguminous crops. This will raise the best quality of pork reared for curing purposes, and will gradually develop types of pigs which will yield a greater proportion of red meat than those fed on corn.

It was recorded in the 1907 edition of this book that we were paying over £12,000,000 yearly for **hog products sent** by America[1] as follows:—Bacon, 2,806,108 cwts., £6,209,009; Hams, 1,042,669 cwts., £2,606,129; Lard, 1,669,996 cwts., £3,041,846; Fresh Pork, 119,259 cwts., £262,450; Salted Pork, 76,977 cwts., £119,423.

The best quality of pork is produced in moderately cold weather. The low temperature renders the flesh firm; it is also produced at a slower rate in cold weather, and is in consequence more mature. There was for a time a tendency to boom small porkers, as there has been a run upon small-sized cattle and small-sized sheep. Carcases of moderate dimensions are no doubt more easily manipulated, and more easily disposed of in a limited business, or to people with small families; but there is no question that for excellence of quality the flesh of a pig weighing 12 to 16 stones is finer, more mature and useful, and better able to serve the dual purposes of fresh pork and bacon curing. A very large proportion of the pork now consumed is eaten fresh, or made into sausages. K. J. J. Mackenzie, Cambridge University, says that the most profitable pig to produce is undoubtedly the bacon pig, which is marketed at about 160 lb., or eight score dressed weight; and it should attain this weight at about six to seven months old.

In bacon production Ireland is an important factor, Munster being far and away the most important area in the United Kingdom in the supply of bacon and pig products. The Munster curers buy their pigs alive, kill them in their own factories, and pay on the dead-weight, while the North of Ireland curers buy their pigs dead minus the offal. As much of the offal must be unmarketable locally, this seems a wasteful custom, in view of the fact which has been stated on what is accepted as reliable authority, that the net profits of the great American meat packing houses are confined to the sums derived from making economic use of what formerly were waste products.

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[1] This figure can be brought down to date from time to time by referring to the Annual Returns of the Board of Trade.

Rolled bacon is a product of the South of Scotland coming into favour in the larger centres of population — Glasgow, Edinburgh, and Leith—and superseding the dry salted article. It is not yet in much demand in England. It was made in a small way in Ayrshire about the beginning of the last quarter of last century. The practice extended to Lanarkshire, and began to expand rapidly in the nineties. It came to Dumfriesshire with the present century, and a few years later to Carlisle, and one of the chief centres of production is A. Kirkpatrick & Son's factory, Thornhill, fitted with up-to-date freezing plant and other modern appliances, by Douglas of Putney, London.

Pigs bought in the surrounding districts are there "felled," bled, skinned, and cleaned, without "plotting" or scraping, and hung up to cool for twelve hours. The bones are cut out by experts, and the quartered carcases are put for three days into brine strong enough to float a potato. The quarters are then ready to be laced tightly into separate rolls with strong twine, and to be put into muslin bags, to be marketed for immediate consumption, as Dumfriesshire rolled bacon. The best sizes are pigs of 9 to 11, up to 15 stones of pork. The following are the products derived from fifteen pigs, brought by rail from a distant milk factory in September 1905:—The fasted live-weight before shipment was 225 stones. The rough weight, including skins and feet (17 stones 2 lb.), was 167 stones 2 lb., leaving a skinned weight of 150 stones (15 stones each). From this figure deduct bones, 17 stones; lard, 5 stones 10 lb.; heads, 8 stones (total, 30 stones 10 lb.) to get the net weight, 119 stones 4 lb., put into the pickling tank.

The selling of **live pigs**—which superseded the practice in vogue up to the last quarter of the nineteenth century, of marketing, usually in autumn when the weather began to get cold, dead carcases that had been killed, scalded, and scraped on the farm—is in turn giving way in some local districts to the home killing of pigs and delivery, cleaned but unskinned, at the rolling factory. Pig skins are largely used to make saddles, etc. The practice of sending milk into towns or to the factory has led in some districts to a reduction in the number of pigs.

DISTINGUISHING CHARACTERISTICS

White Breeds.

The Large White or **Large Yorkshire** is, next to the Lincoln, the largest breed of white pigs in the United Kingdom. Its long coat of moderately fine texture should be free from black hairs, and the skin as far as possible free from blue spots. It is almost directly descended from the original pig of the country without having been so much as others crossed with foreign blood. Though vastly improved within recent years, it still inclines even in its modern form to exhibit the points of the more direct descendants of the wild pig, viz., a hardy constitution, long neck, full towards the shoulders, large head, long nose, face slightly dished, broad almost straight snout, jowl not too heavy, long, thin ears, slightly inclined forward, and fringed with fine hair, strong bone, flattish sides, and, when the great length and weight of the Yorkshire are taken into account, proportional narrowness as compared with the Berkshire. Large white pigs do not develop their points till they are a year or more old. "Both size and quality are most important. Black hairs, black spots, a curly coat, a coarse mane, short snout, inbent knees, hollowness at back of shoulders," are grave objections.

The type of **pig wanted for the American trade** must be free from the rose or swirl of hairs over the kidneys resembling a cow-lick—a characteristic which is often reproduced in the young—though it is appreciated in Yorkshire in pigs for home use. It must not be broader over the shoulder than over the loin, and the head must be longer than is wanted at home. The ears must stand well up, and be of a good size, with a big fringe of hair round the edges. The body hair should be abundant but fine; coarse hair along the back of the neck is very objectionable. The tail should be strong but not coarse, straight, and hanging perpendicularly like a cow's.

The size to which the animals are reared has been much reduced within the last generation, but this is more a matter of change in the system of management than a change in the character of the breed. It was no uncommon sight at the Royal Agricultural Society's Shows a few years ago to see Large Yorkshires estimated to weigh over 50 imperial stones, or as much as a bullock.[1]

The tendency to early maturity, arrived at by care in breeding and good feeding and management, has yet left as an attribute of the breed the property of lean flesh production, as against fat production. It is thought that the general improvement of the large breed of White Yorkshires was initiated by crossing with improved Leicestershire White pigs, which had themselves been improved by Bakewell, who applied to pigs the system of breeding explained at page 19.

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[1] Sanders Spencer's boar, "Sampson VI.," winner at the Royal Society's Shows at Carlisle and Derby, weighed 9 cwts. as he walked.

Pig-breeding in Yorkshire was a favourite occupation of the working classes in the middle of the nineteenth century, and was stimulated by competitions at village shows, held principally for pigs and vegetables. One of the pioneers of the Large White was Joseph Tuley, a weaver of Keighley. At the Windsor Royal Show in 1851 his exhibits met with great success. This created a demand for the "new sort," which speedily brought good prices. Tuley's stock was dispersed over a wide area. In 1868 the R.A.S.E. provided classes for the Large White at Leicester Show, although it was not until 1892 that classes were allotted for pigs eligible for entry in the N.P.B.A. *Herd Book*, the first volume of which was issued in 1885: pedigrees had hitherto been kept only by a few enthusiasts.

The Journal of the Department of Agriculture, etc., for Ireland, for October 1904, says:—

"Recent experience has gone to show that no other pig is so well qualified to meet the requirements of the feeder and owner in Ireland as the Large York." The breed has been taken to many foreign countries, notably to Denmark, to mould the types of animals reared to produce bacon.

The **fecundity** of the breed is indicated by a record of the Cambridge University herd:—

One sow produced 86 pigs in 7 litters, of which 67 were weaned; average 12·3 per litter farrowed and 9·6 weaned. Another had 44 pigs in 4 litters, and reared 37 of them; average 11 farrowed and 9·3 weaned. One had 35 pigs in 3 litters; average 11·7 and weaned 29 of them; grand average of 9·7. Of 17 sows, 4 had an average of 9 or over per litter, and 6 an average of between 8 and 9.

Table giving weights of Large Whites exhibited at the London Smithfield Shows from 1902-11, and 1919-21:—

Class.	Number of Animals.	Average Age.		Average Live-Weight	
		Months.	Days.	Cwts.	Lb.
1902-1911.					
Not above 9 months . . .	88	8	22	3	32
Above 9, not above 12 months .	90	11	6	4	37
Single pigs not above 12 months .	36	11	1	4	48
1919-1921.					
Porkers not exceeding 100 lb. live-weight	6	3	29	0	95
Not above 6 months . . .	9	5	15	2	11
Above 6, not above 9 months .	13	8	15	3	8
Single pigs not above 9 months .	8	8	15	3	23

This shows that the Large White is a good dual-purpose pig.

Prominent Breeders of Large Whites

Richard Bourne, Dowse Green, Cholmondeley, Malpas, Cheshire; Chivers & Sons, Ltd., Histon, Cambridge; D. R. Daybell, Bottesford, Nottingham; A. B. Edwards, Brewery House, Harlow, Essex; Earl of Ellesmere, Worsley Hall, Manchester; Essex County Council, "The Priory," Boxted, Colchester; John Fillingham, The George Hotel, Grantham, Lincs.; Sir Gilbert Greenall, Walton Hall, Warrington; D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh; R. P. Haynes, Delves Green Farm, Wednesbury, Staffs.; F. W. Hickton, Brookfield Farm, Belbroughton, Stourbridge, Worcester; R. Millington Knowles, Colston Bassett Hall, Bingham, Notts.; J. I. Major, Great Whyte, Ramsey, Hunts.; F. B. and F. J. Pitcher, Mangapp Manor, Burnham-on-Crouch, Essex; E. Thomlinson, East House Farm, Tockwith, York; Wellington Live Stock Co. (L. Harrison & Co.), Coolham, Shipley, Sussex; Edmund Wherry, Bourne, Lincolnshire; A. W. White, "Hillegom," Spalding, Lincolnshire; County Asylum Farm, Whittingham, Preston, Lancashire; Winwick Asylum, Visiting Committee, Winwick, Warrington.

The Middle White is the big-jowled and at first uncouth product derived from crossing the large and the small Yorkshire breeds. The latter was evolved early in the nineteenth century, it is believed, by crossing native foundation stock exclusively with Chinese blood under the Bakewell system of breeding. As might have been expected, in accordance with the general laws and principles of breeding, the small improved breed stamped its likeness more distinctly on the produce of the cross than the large and less-refined Yorkshire. The Middle breed is little more than a large variety of the Small White, being only slightly modified in form through its closer relationship with the larger animal.

"Although the historical data of this development are obscure, it was sufficiently persisted in to secure fixity of type and to produce a variety of such commercial value as to result in the ultimate extinction of one of the parent stocks. There is no doubt that part of the success of the new breed has been due to its adoption by breeders who rank as the pioneers of a sound pig-breeding policy in this country. Accordingly, therefore, in common with the Tamworth and Large White, the Middle White was registered in 1885 as a pure breed and one best worthy of cultivation; and the popularity which has followed it during the course of its pedigreed status has fully justified its distinction. It was only natural that a breed evolved from two other breeds of widely different type should be subject to a considerable amount of variation in its earlier history, but it is safe to say that the uniformity in type which now prevails is not excelled by any other breed. Moreover, so long as the elimination of undesirable qualities is pursued with the judgment and energy exhibited by the owners of the leading herds, the Middle White pig is destined to enjoy a progressive popularity."

The Middle White has vastly improved in appearance and in favour with breeders, and its merits have recently been kept constantly before the public in connection with the revival of the system of grazing pigs, and it now ranks as one of the best general-purpose pigs in this country, with special merits in the production of pork.

The following are a few of the **leading breeders** of the Middle White breed:—

H. R. Beeton, Hammonds, Checkendon, Reading; W. T. B. Cartridge, Sidbury, Worcester; John Chivers, Wychfield, Cambridge; S. F. Edge, Gallops Homestead, Ditchling, Sussex; R. P. Haynes, Delves Green Farm, Wednesbury, Staffs.; Victor Hayward, Bookham Grove, Great Bookham, Surrey; W. B. Hill, Fair View Farm, Wednesfield, near Wolverhampton, Staffs.; Arthur Hiscock, Manor France Farm, Blandford, Dorset; J. H. Holland, Peene House, Newington, Folkestone, Kent; Albert Laird, The Manor, Sundon, Dunstable, Beds.; G. V. Manwaring, Crouch House, Edenbridge, Kent; Leopold C. Paget, Middlethorpe Hall, York; Dr M. J. Rowlands, Nash Farm, Keston, Kent; Charles Spencer, Milpond, Little Oakley, Harwich; Capt. W. Waring, Beenham House, Berkshire; Wellington Live Stock Co., Coolham, Shipley, Sussex.

Changes of fashion in the market a few years ago favoured the qualities that are produced in the most perfect form by the Large Black, the Large White, and the Tamworth breeds, as against the quality for which the small breed was prized, viz., that of producing at a rapid rate quantities of over-fat meat.

The Small White (now extinct) was descended on one side from the same native ancestry as the Large Yorkshire, nevertheless the two breeds resembled each other in little but colour. The small breed was noted for its refinement and beauty, its small bone, and its tendency to fatten—qualities acquired through crossing with Chinese pigs. It occupied among white pigs the position which the Southdown sheep holds among the Down breeds. It was not, when bred pure, so much a tenant's pig as a landlord's or a gentleman's pig. It produced excellent fattening animals by crossing with common pigs, or even with the Berkshire.

Points.—The skin and hair were pure white and the body rounded, plump, symmetrical, and free from wrinkles; the head short, on a short thick neck, and the jowl very full; the ears small, short, erect, and inclining forward; the face excessively "dished"; the snout straight and broad while young, but becoming longitudinally much contracted and quite turned up after a time, like the nose of a pug dog; shoulders full and wide; the back very broad, and the belly deep and near the ground; "the general appearance small, thick, and compact when compared with other breeds."

The refined character of the flesh of the Small White adapted it for producing porkers, but the want of a due proportion of lean flesh to fat, besides a want of balance of parts in the animal according to the demands of the bacon-curing trade, excluded it from being a favourite with bacon-curers.

Sanders Spencer described and compared the three breeds as they were towards the end of last century, as follows:—

"**The Large White** should have a good coat of straight white hair of fine quality, and a white skin, with sometimes a blue spot or two. This last characteristic is being bred out by those who have a connection with the foreign trade. The foreigner looks upon it as an indication of cross-breeding, although it is not necessarily so, as large white pigs of the purest strains will occasionally throw a pig with a few spots. A cross of Berkshire blood indicates its presence by the appearance of black spots, both on skin and hair, in the second generation.

"In size, the Large White pig cannot be too large, unless size is gained at the expense of quality. The head should be of fair length, and wide between the eyes; the jowl light; the lower jaw slightly curved; the ears inclined forward; the shoulders no wider than the hips; the ribs well sprung; the carcase deep; the flank thick; the quarters lengthy; the gammon or second thigh reaching to the hocks; the legs straight and well apart, and possessing no more bone than is sufficient to support and transport the carcase.

"Improved Large White pigs are ready for the butcher at any age, and if properly fed and allowed sufficient exercise they will furnish bacon of the quality now most in demand. They are not only prolific, but they are excellent mothers, and rear large litters. A sow bred at Holywell Manor, St Ives, and sold to Hawes of Derby, reared forty-eight pigs as the produce of four farrowings.

"**The Middle White** is a shorter, thicker, and more compact pig. In the matter of quality (except that the carcase is not quite so lean) it is very similar to the Large White. In comparing the points of the two breeds in detail, the head of the Middle-bred pig is shorter and heavier; the ears more upright, or pricked; the nose more turned up; the legs shorter; the hair more abundant, finer, and softer. It is not quite so prolific as the Large White, nor does it make such rapid growth when young, although it fattens as quickly when it reaches the age of six months.

"**The Small White** is now but very little bred in this country. The enormous increase in the demand for lean bacon has led to a complete change in the form and style of pig sought for by feeders within recent years. The Small White, when well grown, will convert meal into pork at less cost than any other breed of pig, but it grows slowly when young, and the sows rear but small litters, although they are often prolific. The form of a Small White is much like that of the Middle-bred, only on a smaller scale. The ears are pricked, and the jowl heavier. Blue spots are looked upon as a sure indication of a cross having been introduced by one of the large varieties."

The Lincolnshire Curly-Coated or **Baston pig** is a purely local breed of great size and merit, chiefly confined to the east of Lincolnshire from the sea-coast as far inland as Louth, Lincoln, Grantham, and Spalding. It is believed to be the modern representative of the breed that Low referred to in the Eastern Counties as being of "a large size, white colour, and with pendant ears." The colour of the skin and hair is white, but most pigs have blue spots which, however, should grow white hair. The hair is abundant, long, and curly when the coat is full grown. The face is shorter than that of the Large Yorkshire, fine, and quite straight in the nose. The ears fall over the face (hence the name "lop-eared"), but must not be too long and heavy, and on no account pricked like the Yorkshire. It is maintained by its advocates that no other breed of pigs will produce, at least in its own district, equivalent weight and quality for age, being equally good as a "sucker" and a bacon pig, and producing the right class of animal for the pork butcher, at 8 stones (of 14 lb.) dressed pork, or any weight up to 40 stones. A sow easily reaches 30 to 35 stones at twelve months old; 40 stones at twenty months after rearing a litter of pigs; and 60 stones at three years old. From figures compiled by W. W. Chapman, London Agent for the Association, it appears by a comparison made in relation "to the whole of the pigs that have been weighed since the Smithfield Club first commenced to do so, that out of the 1059 pigs exhibited and weighed at Smithfield, the Lincolnshire Curly-Coated pig has made the highest average daily gain of any single pig **of any breed**, and that its class average is higher than the class average realised by any other breed. No part has been taken in the competitions in the Carcase Classes at Smithfield, but in the year 1908 ten pigs competed in the class for pigs exceeding 220 lb. and not exceeding 300 lb. live-weight. The average age was 316 days, and an average carcase weight of $215\frac{7}{10}$ lb., or a daily gain of 10·90 oz. was recorded. Ten pigs at an average age of 161 days gave an average carcase weight of 178 lb.—being duly qualified had they been entered to compete in the foregoing class—and gave an average daily gain of 1 lb. 1·68 oz." The breed, although criticised for being too heavy in the fore-quarters, and round and coarse in the bone, is noted for hardiness and thrift, as well as for exceptionally heavy weights, and for being prolific. Seven is a usual number at a first litter, and ten to twelve for a full-grown sow bearing two litters each year. As the milk is poorer after the rearing of the sixth litter, few sows are kept after that time.

Crosses are successful with other British breeds, especially the Berkshire, Large Yorkshire, and Large Black. (See p. 398.)

Some of the **most prominent breeders** are:—

William Abbott, Swaton, Folkingham; A. E. Alliss, Toynton All Saints, Spilsby; Frederick E. Bowser, Wigtoft, Boston; F. J. Caudwell, Manor House, Sibsey, Boston; Arthur Clifton, Fishtoft Manor, Boston; George Freir, Deeping St Nicholas, Spalding; George Freir, jr., "Frognall," Deeping St James, Spalding; W. Evedon Fulforth, Sleaford; George Godson, Asgarby, Heckington, S.O.; Arthur Goodrick, Tumby House, Mareham-le-Fen, Boston; Jesse Lilly, Frithville, Boston; William Pickworth, Whaplode, Spalding; Edmund Royds, Holy Cross, Caythorpe, Grantham; Gersham Simpson, Charnwood, Lowdham, Notts.; F. Stennett, Gainsborough; William Todd, jr., Little Ponton, Grantham; T. J. Ward, Carrington Grange, Boston, and Leadenhall, Holbeach Marsh; R. Welford, Rose Hill Farm, Loftus-in-Cleveland, Yorks; Charles Wilkinson, Midville, Stickney, Boston; Wm. Robert Williamson, Vine Cottage, West Banks, Sleaford.

The Cumberland pig has been well known for over one hundred years, and probably for much longer in the county from which it derives its name, and highly appreciated as a first-rate commercial pig of a strong and distinct type. In T. B. Schofield's historical preface to Vol. I. of the Cumberland

Pig Breeders' Association *Herd Book*, issued in 1916, we find three quotations which indicate that the now so-called Cumberland pig was most probably the breed of the Northern Counties of England at or before the beginning of last century :—

(1) Robert Henderson, farmer, Broomhill, Annan, in a *Treatise on the Breeding of Swine*, written in 1811, says : "The ears (of the Berkshire pig) bend forward, but do not hang down so much as those of the large Cumberland kind" ; and again, "I can recommend a cross from the best-shaped and largest species of the black kind, commonly called the Guinea breed, with a white Cumberland boar." (2) John Bailey, in his *Survey of Durham*, 1813, remarks, that "the breed of swine in this county was formerly a large white kind, with broad ears hanging over the eyes." (3) R. W. Dickson, in his *General View of the Agriculture of Lancashire*, 1815, states : "There is no breed peculiar to it (Lancashire) excepting a middle-sized white sort, which has large slouch ears, and is often found in the North of Lancashire."

The experts who made the preliminary inquiry into the history and character of the breed, were Professor D. A. Gilchrist of the Agricultural Department, Durham University, T. B. Schofield, Live Stock Officer of the Board of Agriculture and Fisheries, and John Steel, M.R.C.V.S., Southley, Wigton, "a keen and enthusiastic breeder of these pigs," and they started the idea of forming a Pig Society. Sanction to proceed with the work came from the Board of Trade on 22nd June 1916.

Pigs were admitted to registration on the certificates of a competent body of Inspectors. Vol. I. of the Register contains 84 boars and 293 sows. The first President was W. Parkin-Moore of Whitehall, Mealsgate ; the Vice-President, John Steel, and the Secretary and Editor, George M. Bell, 1 Lonsdale Street, Carlisle. A few of the prominent breeders, out of a membership of over one hundred, are :—

Sir John Anderson, Dykehead, Blackford, Carlisle ; The Right Hon. Viscount Boyne, Brancepeth Castle, Co. Durham ; R. M. Broadfoot, Whitekirk Mains, Prestonkirk ; T. Cropper, 8 John Ashworth Street, Hamer, Rochdale ; C.W.S. Ltd., Hetton Steads, Lowick, Berwick-on-Tweed ; W. Draper, Bradley Hall, Eccleston, Chorley ; W. Emmerson, Lawrenceholme, Wigton ; Messrs J. S. Jordan & Sons, The Granary, Kendal ; Messrs J. W. Maxwell & Sons, Aglionby Grange, Carlisle ; W. Parkin-Moore, Whitehall, Mealsgate, Cumberland ; H. B. Simpson, Bank Barn Farm, Hamer, Rochdale ; John Steel, M.R.C.V.S., Southley, Wigton ; J. H. Toppin, Musgrave Hall, Skelton, Penrith ; J. J. Wilson, Barclose, Scaleby, Carlisle.

Among the **distinguishing characteristics** adopted by the Association, are :—*Head*—fairly short ; wide snout ; dished face ; wide between ears. *Ears*—large and long, falling forward. *Jowl*—heavy. *Back*—long and level, or with only very slight droop. *Tail*—set high ; not coarse. *Legs*—short, straight, and strong. *Colour*—white. *Skin and Coat*—smooth ; hair straight, fine, and silky, and not too much of it. *Size*—large, without coarseness.

Blue spots are *objections*, and black spots, black hair, and pink ears, *disqualifications*.

The **Old Glamorgan pig**, like the Wessex Saddleback, has been brought into prominence by the "wholesale slaughter of breeding pigs" during the Great War. As a result, a Breed Society was formed, and Vol. I. of the *Herd Book* bears date 1918-1919. Amalgamated 1922 with the Welsh Pig Society.

The origin of the breed is quite unknown, "but its antiquity is beyond doubt, for the general appearance is very different from that of any of the other white breeds of pigs." It bears a very close resemblance to the Large Black, but for the "one outstanding colour difference," and there is every reason to believe "that it has been line-bred in Glamorganshire from time immemorial."

The typical Old Glamorgan pig is of a pleasing appearance. Spotlessly white in colour, it has a well-formed body, excellent quarters, and short straight legs; the head is of medium length, with long, thin lop ears inclined well over the face, and extending as far forward as the nose; the tail is long, reaching below the hocks; the eyes may be either of two colours, brown or blue; and the coat consists of a moderate quantity of straight silky hair.[1]

It is essentially a grazing pig, very hardy, prolific, thrifty, and of a quiet disposition; the revival of the old practice of outdoor feeding has done much to bring its special qualities to public notice.

It is a vast improvement on the **Welsh hog** described by Clare Sewell Read in the *Royal Agric. Soc. Journal* for 1849 as follows:—"It is distinguished by its large size, long pendant ears, coarse bristles and thickness of bone. Crossed with the Berkshire they retain the great size of the original stock and the early maturity of the English breed; still for bacon the old sort is preferred on account of the great quantity of lean in proportion to the fat. Every labourer strives to have his pig, which is reared with great care. It is not confined to a sty, but fed from a bucket near the cottage door seven or eight times a day. The pigs roam all about the roads and lanes, and retire to their hovels at night. In summer it is customary to boil the refuse of the garden and wild herbs with the bran that is sifted from the barley and oatmeal.

The Society's **objectionable points** are:—Narrow forehead; dished nose; thick, short, or coarse ears; a coarse and curly coat and bristly mane; and its disqualifications:—Any other colour than white, and pricked ears.

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[1] Old Glamorgan Pig Society *Herd Book*, Vol. I.

List of **Breeder Members** of the Old Glamorgan Pig Society:—

Annie Bussell, Vardre Uchaf, Llantwit Vardre; Henry David, The Bryn, Pendoylan, Cowbridge; Jones Bros., Maesyward, Bonvilston, Cardiff; Naomi Llewellyn, Three Horse Shoes, Welsh St Donatt's, Cowbridge; William Morgan, Mardy Newydd, Bonvilston, Cardiff; Thomas Richards, Brigam Farm, Pontyclun; Cadwaladr Williams, Brynteg, Heolycyw, Pencoed.

The Old Welsh breed was very long in the face, with long lop ears, a long body, and a hardy constitution. Welsh pigs of the present day are mongrels of superior types, containing in different localities admixtures of at least four of the most useful of our English pigs, viz., Large Whites, Large Blacks, Berkshires, and Tamworths, grafted on the original stock of the Principality. They are credited with producing a large proportion of lean pork in proportion to fat, are very hardy, and thrive better altogether than pure-bred pigs do when exposed to the rough and tumble of an ordinary farm, where pigs receive only a minimum of attention. They are in favour in Lancashire, where many are grazed and fed in the open. The characteristics of the breed are best seen in a sow that has had two or three litters. Then her great length of head and snout, and length of body (a correlation on which much store is put) have had time to develop. The ears should be thin and clear, and very large, the neck long, the shoulders comparatively narrow, the back long, the sides deep, and the hind-quarters good. The colour varies considerably: it is sometimes white; but at times white with large patches of blue skin growing white hairs; occasionally black and white, but not often; and in some districts chestnut takes an important place. An excellent class of pig is bred in the Island of Anglesea, where the common breeding sows, which still exercise a considerable influence on the type, are crossed by a boar of Tamworth and Berkshire origin; in proportion of blood about two of the former to one of the latter. The people interested do not care for the Large White, nor yet for much Berkshire blood. The latter's chief function is to widen the back when it tends to become too narrow. In the district surrounding Bridgwater the cross has been made with the Large Yorkshire and the Large Black pig, known locally as the Cornish Long-eared. They make long and heavy pigs of twelve score weight, which bacon-curers want, but are rather big-boned. In the Oswestry neighbourhood the predominating colour is red with black spots all over; but it is diminishing, owing to the use by some breeders of pure-bred Tamworth boars. Pigs of this variety, for which even the distinction of a breed has been claimed owing to its antiquity, grow very large. Most farmers kill three or four every year, about twelve months old, averaging some twenty score, and going up to twenty-five score or more. The surplus they usually sell as stores (weaners and shots) from 25s. up to 50s. each, many of which find their way to the considerable monthly fair at Llanerfyl.

The Long Lop-Eared White pig, the pre-war "Devonshire White," is the last of the old breeds that have recently come into public notice and acquired a *Herd Book*. Separate classes were provided for it at the Devon County Show at Tavistock in 1921. It is a local breed of Devon and Cornwall, and certain strains can be traced back for nearly a century. It is not numerously represented, having been kept mostly by small farmers and cottars, few of whom had more than one or two sows at one time. Nevertheless the Breed Society ended its first year with a membership of 120 and a bank balance of £250. "The breed is pure white, very true to colour, and there is no trouble with spots." It is well described as a "Large Black in every respect but colour." The head and the nose, which is straight, not dished, are both of medium length; the ears broad, long, thin, and inclined well over the face; the jowl medium in size; the neck fairly long and muscular; the shoulders neither thick nor coarse; the tail of moderate size set high, and the skin and coat fine and soft, with a fair quantity of straight silky hair, free from bristles, for protection against the cold and the sun. They are contented, good grazers, and fatten rapidly when penned. The litters are claimed to average eight to eighteen, seventeen being quite common.

The Large White Ulster breed of pigs, in absence of any historical record, is believed to have "become evolved from the old Irish pig which authors have styled the 'Greyhound pig of Ireland.'" Northern breeders, discouraged from following the open-air method of management in favour in the more congenial climate of the South, adopted an indoor system of breeding and feeding, and acquired a striking uniformity of type throughout the entire Province. This system has refined the original coarse and unthrifty characteristics of the aboriginal pig, and promoted early maturity. The hair, not being required for protection, has "diminished in quantity and become much softer and finer." About the beginning of last century there was also a shorter and thicker-set Black Ulster pig highly favoured in some localities, and crossing it with the White produced the Irish "Belty." Both types have disappeared in competition with the Large White which was favoured by Northern bacon-curers. Attempts have been made from time to time to improve the Ulster White by imported English blood, but the native breed has proved the most suitable, "with the result that throughout Ulster to-day it is practically the only one to be found, and for early maturity and economy of production, high class flavour and quality of bacon, it is unsurpassed."

In 1909, the Royal Ulster Agricultural Society, with a view to encouraging breeders to improve the native stock, instituted a *Herd Book* of the "Large White Ulster," with a standard description and scale of points. "The rapid improvement along approved and definite lines has been phenomenal, and the wider publicity gained for the breed through the medium of the *Herd Book* has assisted in forcing it into favour not only in every county in Ireland, but in several parts of Great Britain." "In Ulster young pigs, put to fatten when they are weaned at from eight to ten weeks old, reach about 170 lb. four months later. The pork is of the best quality and realises the highest market price. The sows are prolific, quiet in disposition, regular breeders, and good mothers."

Leading Breeders of Large White Ulster Pigs.

George Bell, Ardlauragh, Glenavy, Co. Antrim; Robert Bell, Demesne Farm, Baron's Court, Newtownstewart, Co. Tyrone; J. Cunningham, Glencairn, Belfast; W. H. Galbraith, J.P., Craigadooes, St Johnston, Londonderry; George Harrison, Gainford Hall, Darlington; Thomas Lindsay, Derryboy House, Crossgar, Co. Down; W. J. M'Elroy, Rossadowney, Londonderry; J. Marchbank, Agricultural School, Muckamore, Co. Antrim; W. R. Nelson, Ardlauragh, Glenavy, Co. Antrim; James Short, J.P., Wood Park, Anney, Beragh, Co. Tyrone; W. R. Smyth, Ballyalgin, Crossgar, Co. Down; John Wallace, Anticur, Dunloy, Co. Antrim.

DARK BREEDS.

The Large Black pig is one of the oldest breeds. No history of its evolution exists. It has recently emerged from comparative obscurity, as prior to 1900 its showyard appearances were practically confined to classes at the Royal Cornwall Agricultural Society, the Devon County Agricultural Association, and the Suffolk Agricultural Association.

Large Blacks have been bred in Cornwall with care since the middle of last century by R. S. Olver of Trescowe and George Lucas of Leigh Barton, and their forebears; and the Kenwards of Pilt Down, Sussex, are credited with maintaining the purity of their strain for over one hundred years. The breed was decidedly local and "found chiefly in Devon and Cornwall and Suffolk and Essex." The West Country pig was the larger and finer breed, while the East Country type was generally more hardy and prolific—qualities which have been blended with advantage in recent years. Among the common pigs of the Eastern Counties there still linger the descendants of the so-called "Large Black Essex pig," which are extremely hardy, having smaller ears and a longer snout than the orthodox improved type, which is breeding it out.

The animals were at first very large and coarse, of great length, with plenty of bone, and often weighed over 40 score pound: they were inclined to be very "gutty" and coarse in the flank with a rounded uneven back. They had long faces and rather long ample ears extending over the nose. The shoulders were very thick and bony, but there was not enough of depth behind the shoulders. The low-set tail was thick and long and furnished with plenty of coarse hair which served to switch away flies when grazing. It was the practice to run the "barrows" (castrated males) at grass till twelve months old before placing them in the sties to fatten into bacon for curing or pork for home consumption—at that time the chief meat supply of the farm.

Since the *Herd Book* was instituted in 1899 and a trade mark in the form of a shield decided on in 1902, there has been a remarkable development of desirable points and grading-up of the poorer types, with an eye to meet all the requirements demanded by the butchers and bacon-curers of to-day, viz., a wealth of lean flesh free from coarseness, and a "wonderful length of side to yield prime interlean bacon," in other words, size with quality.

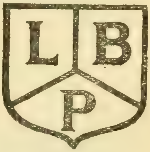

Fig. 44.

Distinguishing Characteristics.—The head of the modern Large Black is broad and the face of medium length, much shorter than in the old type, with a straight snout; nicely carried long thin ears, well under command, inclined well over the face, in rather than out, and set on wide apart; the jowl medium in size; the back long and level (a slight rise in the centre is not objected to); tail set high, the larger the better if not coarse; legs short, straight, set wide; skin fine and soft, of a whole black colour of a mealy hue, easily cleaned and not liable like White to sun-scald, with a moderate quantity of straight silky hair. The chief objections are any unshapeliness or deformity, especially about the limbs; a narrow forehead or dished nose, prick ears, or thick and coarse like a cabbage leaf and not under control; a bristly mane, or a curly or coarse coat resulting in black hair roots being seen in the belly flesh; a tendency to redness on the thinner skin, also above the roots of the ears, and any other colour than black.

Large Blacks are docile in disposition, very active, and well adapted to field grazing. The large ears encourage them to settle by obscuring objects at a distance.

The progress and sudden popularity of the breed is phenomenal. The King has become a member of the Society, and has established a herd at Windsor; the Prince of Wales has also joined, and started a herd at the Duchy of Cornwall Farm at Stoke, Climsland; and herds have been established all over the country. In Scotland, where in 1918 there was only one registered herd, there were over sixty before the end of 1921, and E. G. Wright of Aberdeen had been co-opted on the Council to represent the Northern breeders. A Champion Cup is now offered at the Royal Show. The Bath and West Show held at Bristol in 1921 had numerous Champion and other prizes offered by the Society. The Champion boar over all breeds was a Large Black. Prizes have also been offered at the Highland and Agricultural, Peterborough, Royal Cornwall, Royal Counties, Royal Norfolk and Suffolk, and Yorkshire Shows, and at fifty of the smaller shows. At the **Smithfield Club Show** in 1913 the breed gained the Champion Plate for the best single pig against all other breeds. It also showed the highest individual gain with an average of 2 lb. 0·63 oz.; the heaviest pen of two pigs were Large Blacks, 9 cwts. 1 qr. 22 lb., and the heaviest single pig was a Large Black, 5 cwts. 1 qr. 25 lb.[1] The breed also gained the Championship for the best single pig in 1920.

The year 1919 was noteworthy on account of the number of **successful sales**, given below in chronological order, although the record price for sows, viz., 455 guineas made at the Sudbourne Hall disposal sale of Kenneth M. Clark's herd in 1918 was not reached :—

	No.	Total.			Average.			Top Price.
		£	s.	d.	£	s.	d.	Guineas.
T. F. Hooley	146	4720	5	6	32	7	3	175
H. Groom	100	4051	8	6	40	10	4	115
B. C. Perowne	76	1803	18	0	23	14	2	60
S. Owen Webb	114	3808	0	0	33	8	3	130
A. B. Ringer	95	3523	16	0	37	2	0	155
R. Ag. Soc. of Eng., Cardiff	98	5159	19	9	52	13	0	380
Mrs Wormald	100	2990	8	4	29	18	1	85
R. S. Hicks	75	2907	9	0	38	15	4	240
A. Le Blond	42	1042	0	0	24	16	6	80
Cowell & Playle . .	81	4100	5	0	50	12	5	175
Countess of Warwick .	56	1779	15	0	31	15	7	105

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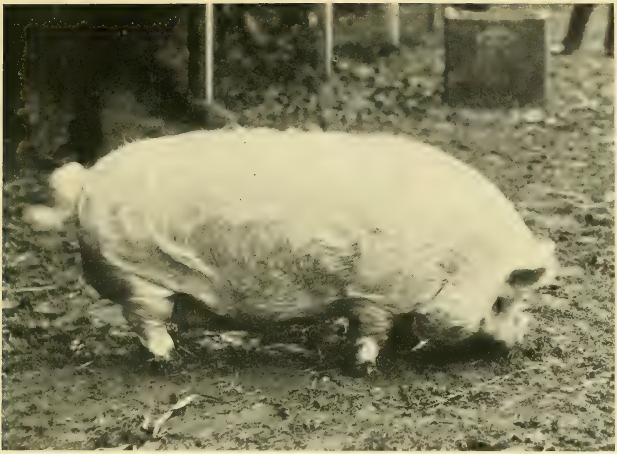
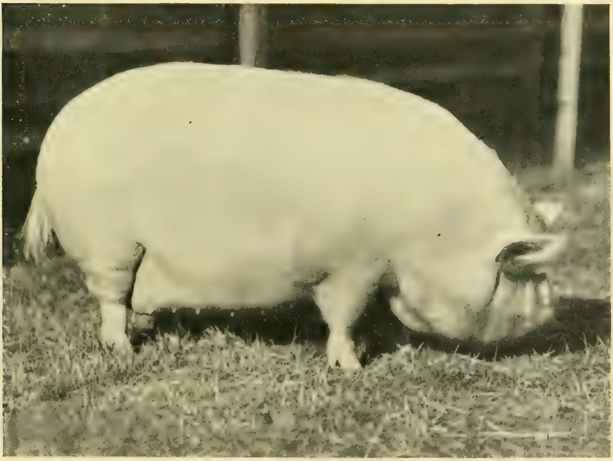
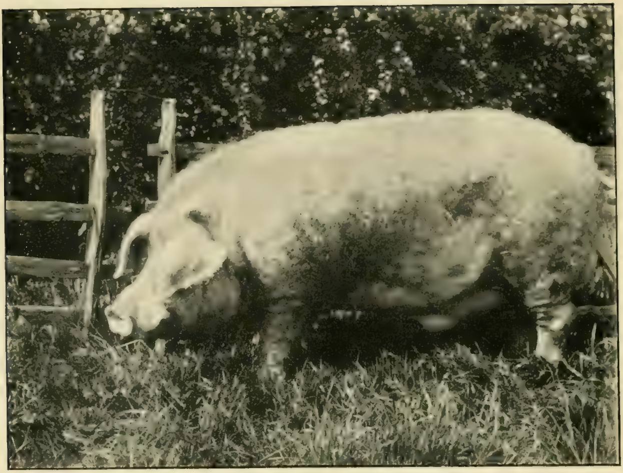
[1] A black-and-white cross pig, seventeen months old, bred and fed at Park Farm, Skelwith, Westmorland, turned the scale at 38 stones, 12 lb. in 1922.



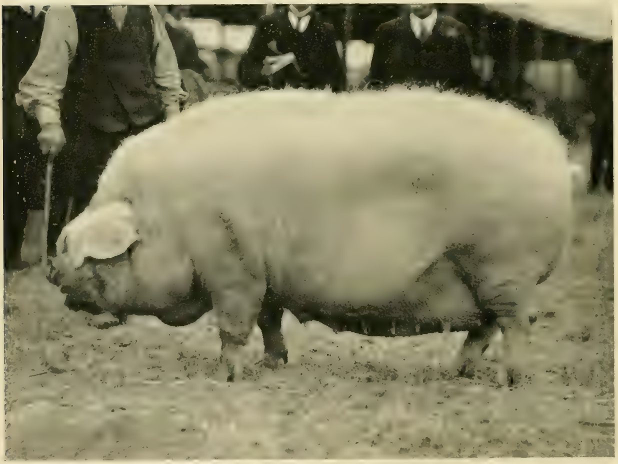
A. SMALL WHITE SOW (Extinct).
First, R.A.S.E. Show, Park Royal, 1903.
Owned by Hon. D. P. Bouverie, Coleshill House, Highworth, Wilts.



B. MIDDLE WHITE SOW, "WHARFEDALE ROYAL LADY." Born January 1920.
First Gold Medal and Silver Challenge Cup at Derby Royal. Owned by Leopold Paget.
["*Agricultural Gazette Photograph.*"

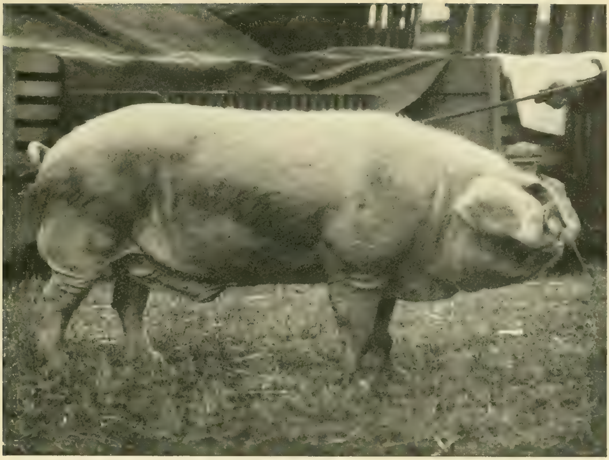


A. Curly Lop-eared Lincoln Boar, "Midville Bob.
First at Lincoln Show, 1906.



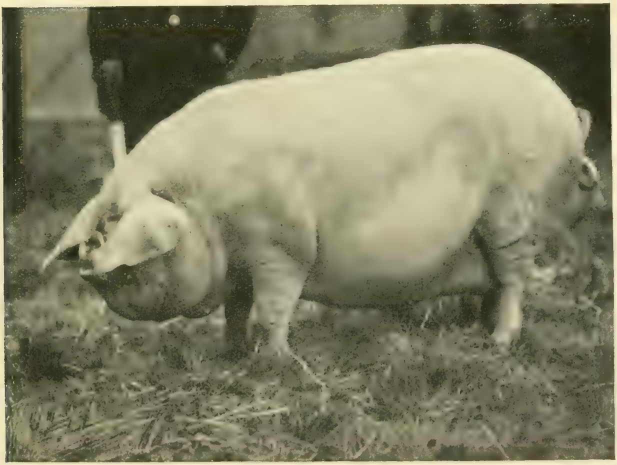
B. Lincoln Curly Coated Sow, "Deeping Lady.
Prize-winner at Derby Royal. Owned by G. Freir.

[*"Agricultural Gazette Photograph."*



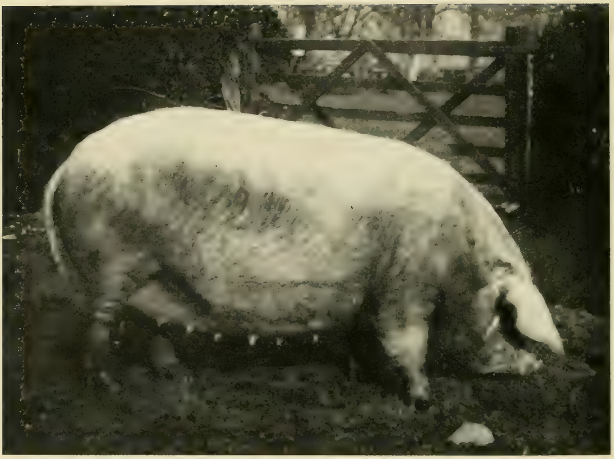
A. CUMBERLAND BOAR, "ROYAL." Born May 1919. First at Cambridge Royal, 1922. Property of J. Steele.

[*"Agricultural Gazette Photograph.'*

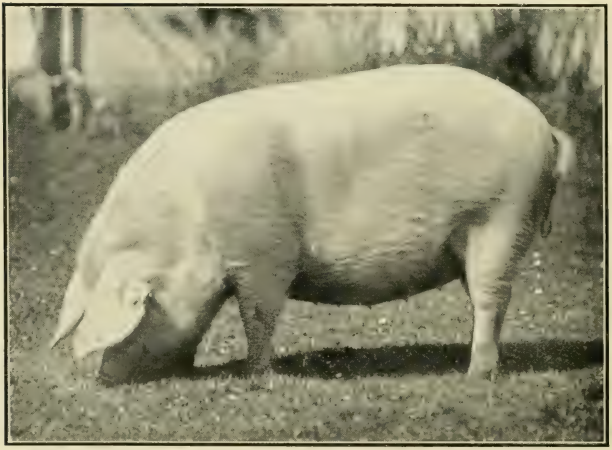


B. CUMBERLAND SOW, "SOUTHLEY BLOOM." Born January 1920. First at the Derby Royal. Owned by John Steel, M.R.C.V.S.

[*"Agricultural Gazette Photograph."*

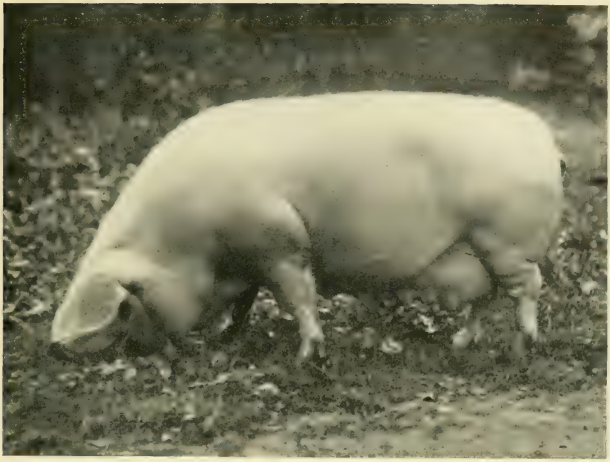


A. OLD GLAMORGAN SOW, "ACORN QUEEN," No. 28, Vol. II.

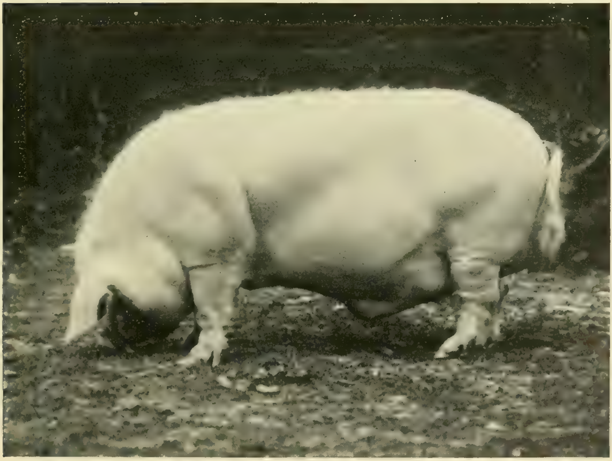


B. LOP-EARED WHITE SOW, "IPPLEPEN PRIMULA." Her Sire "Yett Masterman" weighed 39 score, 13 lb. when killed in working condition.
Owned by H. J. Kingwell, Bow Grange, Totness.

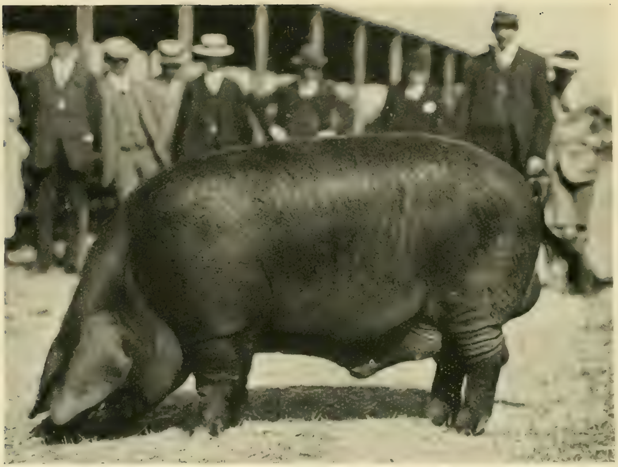
[*Lent by "Modern Farming"*



A. Large White Ulster Sow, "Garvallagh Princess II." (2628).

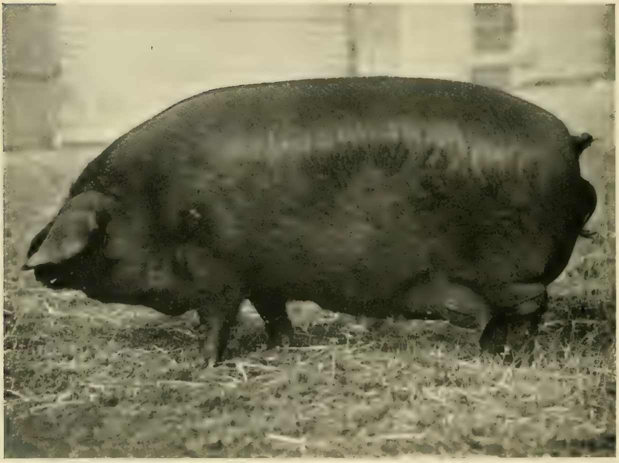


B. Large White Ulster Boar, "Rossdowney Styles" (1727).



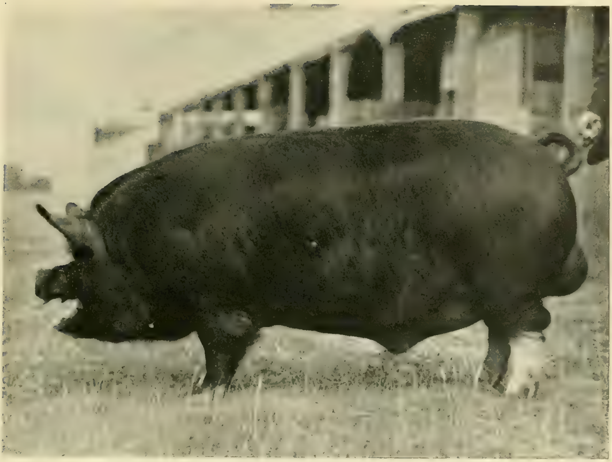
A. Large Black Boar, "Fentongollan Result." Born September 1918.
First, B. and W., 1921, First and Champion, Derby Royal, and First, Cambridge Royal.
Owned by T. F. Hooley.

[*"Agricultural Gazette Photograph.'*

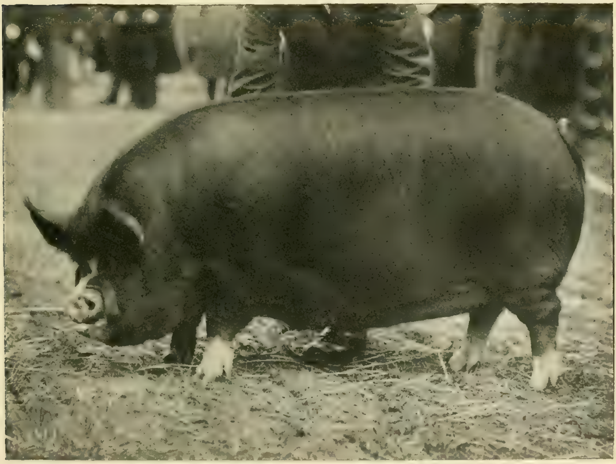


B. Large Black Sow, "Easton Bessie I."
Aged 2 years 1 month. Champion Highland Show, 1921. Owned by the Marquess of Graham.

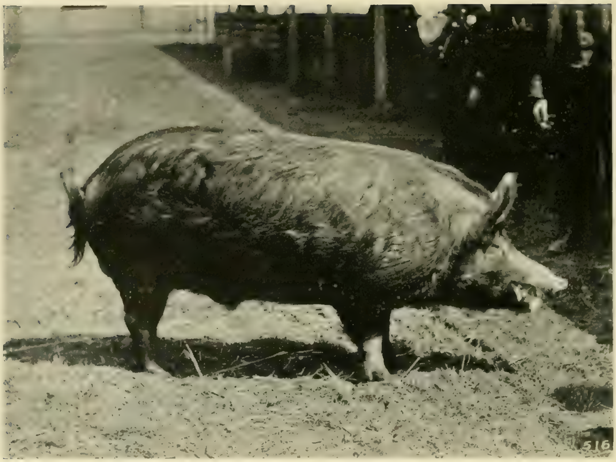
[*"Agricultural Gazette Photograph."*



A. BERKSHIRE BOAR, "HAMMOND'S HOTTENTOT." Aged 3 years 2 months.
First and Special at Highland and Second at Royal Show, 1921. Owned by W. H. Palmer.
[*"Agricultural Gazette Photograph."*

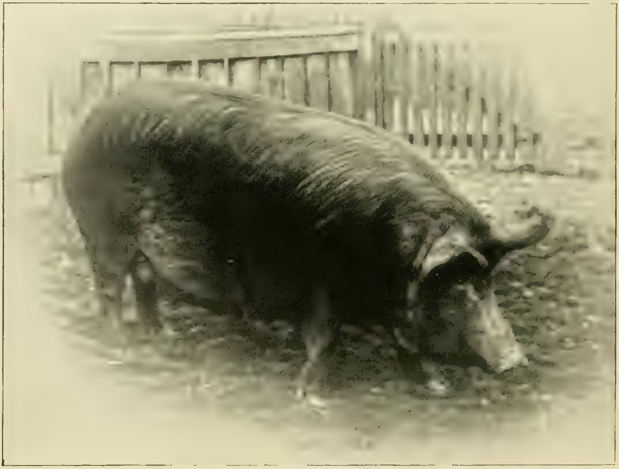


BERKSHIRE GILT (16 months) "MISS DAINTY."
Six times Champion, including Champion and Reserve for Breed Champion and for the Eaton Challenge Cup at the 1922 Royal Show. Believed to be of unsurpassed merit for age.
Owned by Ifold Herds, Limited, Proprietors of L. Harrison & Company's
Pedigree Live Stock Farm, Horsham, Sussex.
[*"Agricultural Gazette Photograph.*



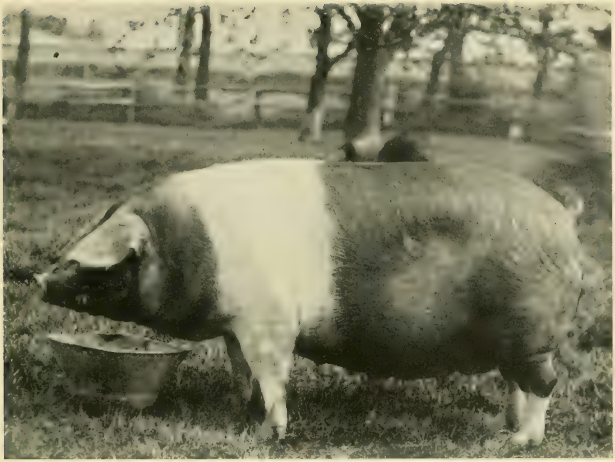
A. TAMWORTH BOAR, "KNOWLE WARRIOR."
First, R.A.S.E. Show, Park Royal, 1903.
Owned by Rob. Ibbotson, The Hawthorn, Knowle, Warwickshire.

[*C. Reid, Wishaw.*

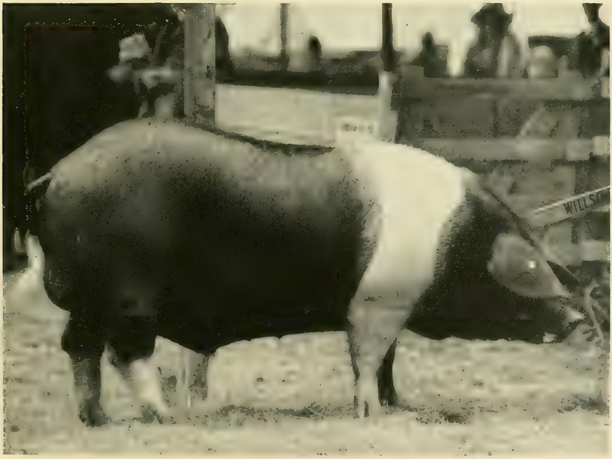


B. TAMWORTH SOW, "WHITACRE CACTUS" (13562).
Winner of many prizes, including First, Great Yorkshire, and Champion, Royal Lancashire, 1904.
Owned by D. W. Philip, The Ashes, Whitacre, Birmingham.

PLATE XCVII.

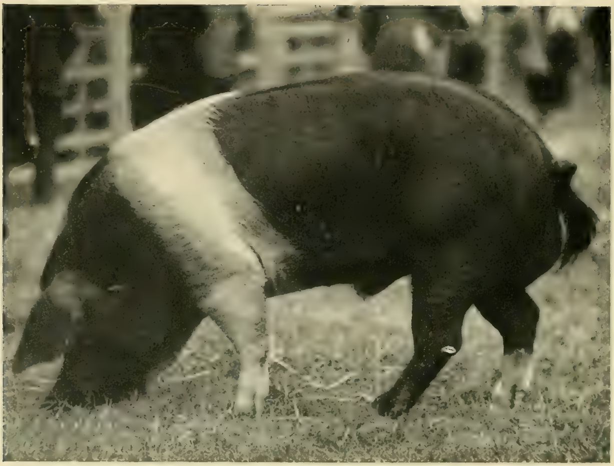


A. Essex Sow, "Brooks Perfectus."



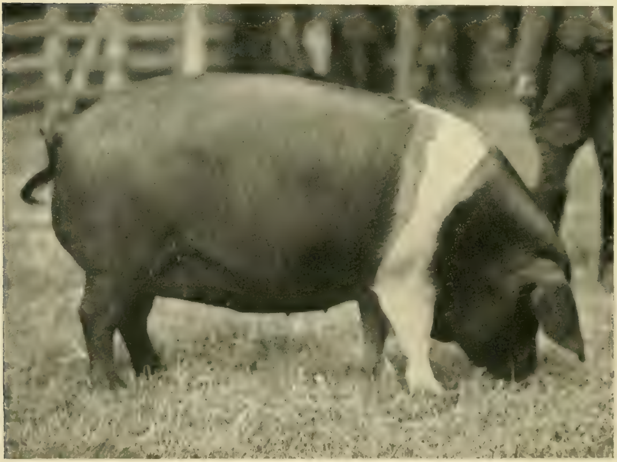
B. Essex Boar, "Chelmer Brutus." Born 20th January 1921.
First and Res. Champion, Derby Royal. Owned by G. and E. Kemsley.
Bred by E. H. Sikes, Ingatestone.

[" *Agricultural Gazette Photograph.*"



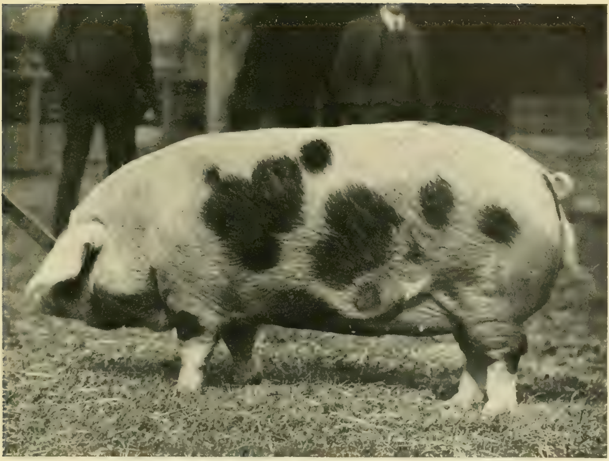
A. Wessex Saddleback Boar, "Eastington Nimrod 81st." Born 15th April 1919.
First at Darlington Royal.

["*Agricultural Gazette Photograph.*



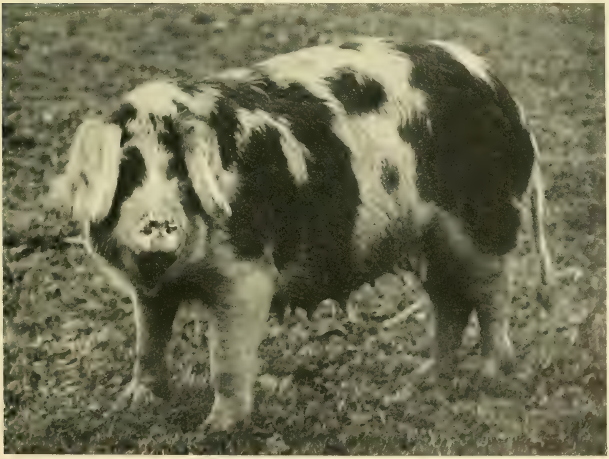
B. Wessex Saddleback Sow, "Eastington Dark Ladye." Born April 1919.
First and Res. Champion, Darlington Royal.
Owned by Misses F. Donisthorpe and G. de Montgeon.

["*Agricultural Gazette Photograph.*"

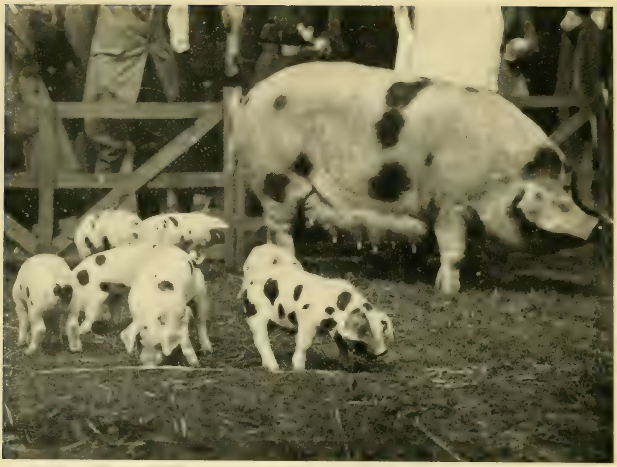


A. Gloucester Old Spot Sow, "Sonderna Mascot." Born January 1921.
First and Breed Champion at Plymouth, First and Champion at Guildford.
Owned by Sir J. Anderson.

[*"Agricultural Gazette Photograph."*

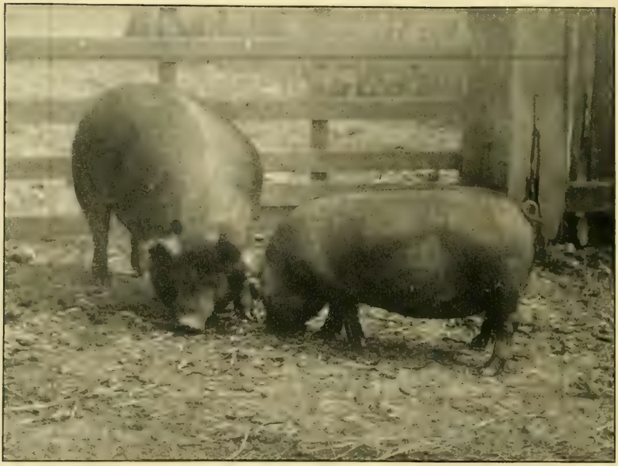


B. Gloucester Old Spot Sow.
Bred by Captain Brassey, Cottesbrook Hall, Northampton.



A. Gloucester Old Spot Breeding Sow and Litter.
Female Champion and Res. Breed Champion, Cambridge Royal, 1922.
Owned by H. J. Staff.

[*"Agricultural Gazette Photograph."*



B. Suffolk Small Black Pigs.
Bred early in the nineties of last century by the Duchess of Hamilton, at Easton Park, Wickham Market.

The sale in 1920 at Dry Drayton of Terah F. Hooley's herd broke previous records, 82 head making an average of £122, 15s. and realising £10,066, 7s.

Large Blacks have been **exported** to Austria, Belgium, Cyprus, Denmark, France, Germany, Gibraltar, Holland, Italy, Poland, Portugal, Russia, Spain, Switzerland ; also to Argentina, Ascension Island, Brazil, British East Africa, British Guiana, Canada, Chile, China, Jamaica, New South Wales, New Zealand, Orange Free State, South Australia, Tasmania, Transvaal, Trinidad, United States, Western Australia, and Zululand.

Prominent breeders of **Large Blacks**:—

H.R.H. The Prince of Wales, K.G., Stoke Climsland, Callington, Cornwall ; Mrs Pratt Barlow, Lynchmere House, Haslemere, Surrey ; Harry E. Bastard, Tinten Manor, St Tudy, Cornwall ; A. H. Cobbald, Acton Hall, Sudbury, Suffolk ; J. D. Crewdson, Syde, Cheltenham ; S. F. Edge, Gallops Homestead, Ditchling, Sussex ; John H. Glover, Delamore Farm, Cornwood, South Devon ; G. A. Goodchild, Oak House, Great Yeldham, Essex ; H. Groom, Docking, Norfolk ; T. F. Hooley. Dry Drayton, Cambridge ; F. A. Johns, Cleave, Lifton, Devon ; Miss K. Kay-Mouat, The Firs Farm, Malvern Wells ; H. J. Kingwell, Bow Grange, Totnes, Devon ; A. Dyson Laurie, Homefield, Sevenoaks, Kent ; H. R. Lucas, Bonyalva, St Germans, Cornwall ; A. S. Mann, Blaxhall Hall, Wickham Market, Suffolk ; John C. Olver, Woodland Valley, Ladock, Cornwall ; Alfred Playle, Bassingbourn, Royston, Herts ; A. Beverley Ringer, Swardeston, Norfolk ; J. and H. Robinson, Iford, Lewes, Sussex ; S. R. Sherwood, Playford, Ipswich ; Stanley A. Stimpson, Park Farm, Bixley, Norwich ; W. S. Ward, Menna, Grampound Road, Cornwall ; Thomas Warne, Trevisquite Manor, St Mabyn, Cornwall ; John Warne, Tregonhayne, Tregoney, Grampound Road, Cornwall ; W. J. Warren, Deacon's Farm, Staplegrove, Taunton ; Joseph Watson, Sudbourne Hall, Orford, Suffolk ; Wilkin & Sons, Ltd., Tiptree, Essex ; W. Wills, Marlwood, Thornbury, Glos.

The Berkshire of modern type is black, with all the feet and the tip of the tail white and the face white ; the body long, low, level and deep, with the tail set high on a straight back. The head is of moderate length and well dished ; the ears, set wide apart, are fairly large, carried erect or slightly inclined forward, and fringed with fine hair. The ribs are well sprung ; the legs strong, straight, and squarely set, and the animal stands well on its feet. The hair is long, fine, and plentiful over the body. In size it is intermediate.

Berkshire sows at six months in ordinary growing condition, getting proper exercise, weigh from 150 to 160 lb. ; and boars from 160 to 170 lb. Sows in breeding condition weigh from 400 to 500 lb. at one year, and 550 to 650 lb. when full grown. Boars one year old in show form have been known to weigh 600 lb.

At **Smithfield Show** between 1883 and 1916, thirty-four Championships were awarded in the live classes, and of this number, pure-bred Berkshires won sixteen times and Berkshire cross-breds seven times. During the same period, pure-bred

Berkshires have been awarded the Reserve Championship nine times.

In the **Carcase Competitions** at the Smithfield Club Shows, the table on page 403 shows that every year since these competitions have been held—open to pigs of any breed or any cross—pure-bred Berkshires have won both the Championship and the Reserve Championship, and that the first prizes in every class have been won every time by Berkshires except on six occasions, and on two of these the winner was a Berkshire cross.

"**Standard of excellence**" adopted by the B.B.S. Council:—

Colour—Black, with white on face, feet, and tip of tail. *Skin*—Fine, and free from wrinkles. *Hair*—Long, fine, and plentiful. *Head*—Moderately short, face dished, snout broad and wide between the eyes and ears. *Ears*—Fairly large, carried erect or slightly inclined forward, and fringed with fine hair. *Neck*—Medium length, evenly set on shoulders. *Jowl*—Full and not heavy. *Shoulders*—Fine and well sloped backwards; free from coarseness. *Back*—Long and straight, ribs well sprung, sides deep. *Hams*—Wide and deep to hocks. *Tail*—Set high, and fairly large. *Flank*—Deep and well let down, and making straight underline. *Legs and Feet*—Short, straight, and strong, set wide apart, and hoofs nearly erect.

Imperfections.—A perfectly black face, foot, or tail. A white ear. A crooked jaw. White or sandy spots, or white skin on the body. A "rose" (or swirl of hair) back. A very coarse mane, and inbent knees.

Berkshires have been favourites in this country where the climate is not too cold—the boars being valuable for crossing with common stock, and thus producing the finest bacon and pork in proper proportions of fat and lean mixed. They have for a long time been widely distributed throughout both England and America, and they are a conspicuous feature even in the great Hog Market of Chicago, where the lard-producing pig is in the ascendant. They are a prominent breed in Australia, New Zealand, South Africa, and Argentina. Ireland owes more to the Berkshire than to any other British pig. The produce of a Berkshire sow by a white boar is almost invariably white, though dark and broken colours frequently appear in after-crosses.

The "tawny or reddish colour" in this breed referred to by Low and illustrated in his collection of paintings in Edinburgh University, has disappeared; but it comes out in second or later crosses from white sows, and it remained long in evidence in the pure breed in the form of reddish patches—all being an indication of the relationship of the breed to the chestnut-coloured native pig.

TABLE SHOWING BREEDS OF CHAMPION AND FIRST PRIZE WINNERS OF CARCASE CLASSES AT SMITHFIELD CLUB SHOWS.

	Class.	1916.	1915.	1914.	1913.	1912.	1911.	1910.	1909.	1908.	1907.	1906.	1905.	1904.
First Prize Winners.	One Pig not over 100 lb. live-weight	Berkshire and Mid. White Cross.	Berkshire	Berkshire	Mid. White	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire
	One Pig not over 9 months old, above 100 lb., not over 220 lb.	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire
	One Pig not over 12 months old, above 220 lb., not over 300 lb. live-weight	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Large and Mid. White Cross	Berkshire	Berkshire	Berkshire	Lge. Black and Large White Cross	Berkshire and Middle White Cross	Berkshire	Berkshire
	One Pig above 160 lb. not over 240 lb., best for bacon	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	..	..	..	..	..	..
	Championship . .	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire
	Exhibitor and Breeder .	J. Fricker	Buckley, W.	A. Hiscock	S. Sanday	S. Sanday	J. A. Fricker	J. A. Fricker	Middlesex Co. Asylum	Middlesex Co. Asylum	Middlesex Co. Asylum	Middlesex Co. Asylum	Duchess of Devonshire	Duchess of Devonshire
	Reserve for Championship	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire	Berkshire
	Exhibitor and Breeder .	A. Hiscock	A. Hiscock	A. Holland	F. Walter	Buckley, W.	W. Buckley	A. Holland	W. V. Judd	Middlesex Co. Asylum	Middlesex Co. Asylum	Earl of Carnarvon	Middlesex Co. Asylum	Duchess of Devonshire
	Total Number of Competitors . . .	26	34	30	40	51	51	35	26	36	33	36	37	35

The Championship and Reserve were first awarded in 1904; a 4th Class added in 1910.

EXPORT CERTIFICATES ISSUED, B.B.S., 1905 TO 1917.

To	1917.	1916.	1915.	1914.	1913.	1912.	1911.	1910.	1909.	1908.	1907.	1906.	1905.	Total.
Africa, South	8	43	15	21	..	50	22	9	13	7	..	9	11	203
Africa, East .	..	..	..	4	22	..	6	..	..	..	..	..	..	32
Argentina .	4	1	8	9	212	..	..	1	23	182	344	150	70	1004
Australia .	7	..	6	11	..	5	7	12	6	6	8	12	23	103
Brazil . .	..	36	..	20	20	15	3	38	6	5	2	10	8	163
Canada . .	..	2	2	1	30	7	11	..	2	13	44	14	12	138
Chili . .	3	3	..	2	..	..	..	11	..	..	..	..	..	19
Denmark .	..	..	..	..	..	..	1	..	..	..	..	..	..	1
Eucador .	..	..	..	6	..	..	..	..	..	..	..	..	..	6
France . .	4	..	5	..	..	..	..	..	..	3	2	9	8	31
Germany .	..	..	..	3	10	6	9	22	19	4	11	..	10	94
Honduras .	..	..	..	..	..	..	1	..	..	..	..	..	..	1
Italy . .	..	..	..	18	63	..	..	..	..	..	..	..	..	81
Japan . .	3	5	3	..	5	9	2	18	..	7	9	13	..	74
Jersey . .	..	..	..	..	2	..	..	..	3	..	..	..	..	5
New Zealand	..	..	..	2	..	..	..	..	..	4	1	..	..	7
Portugal and Spain	..	..	..	..	19	4	1	2	..	5	..	..	..	31
Russia . .	..	..	..	11	18	8	10	15	30	12	10	11	4	129
Uruguay .	..	..	2	..	11	..	..	12	..	..	..	..	..	25
U.S. America	1	1	..	9	7	5	1	28	1	6	23	60	7	149
West Indies .	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Summary .	25	91	41	117	419	109	74	168	104	254	454	288	153	2297

The breed is to some extent indebted for its world-wide popularity to the prominent position gained for it mainly by the persevering efforts of William Hewer of Sevenhampton and the Rev. H. Bailey of Swindon, two enthusiastic and successful breeders, as early as 1862, when the Royal Agricultural Society of England gave it a separate class at the Show. Hewer, before the days of sensational prices, sold the year's produce, newly weaned, of one sow at £150, or £10 apiece. The next **prominent breeders** were Captain Stewart of Gloucester; Russell Swanwick, R.A.C. Farm, Cirencester (who sold "Sambo II." to go to Canada at £75 about 1870, and frequently sold sows before the end of last century at £25 and £30); William Hewer, jr., Wheeler & Son, Fowler of Aylesbury, and Heber Humfrey, then of Kingstone Farm, Shrivenham, Berks. The last was one of the first breeders to refine the rough type of Berkshire, winning prizes at Bristol Show in 1864. He was a first-rate judge, kept a very large herd of pigs, which took hundreds of prizes, and he exported many to America. He was chiefly instrumental in the promotion and formation of the Breed Society, of which he was, for twenty years (till his death in 1904), Permanent Secretary, and the compiler of the *Herd Book* or Annual Volume of pedigrees. His son, Edgar Humfrey, now Secretary, was appointed to succeed him.

At the inaugural Annual Show combined with a Sale (1919), supported by thirty exhibitors, to be held in future on the second Wednesday of April, under the auspices of the British Berkshire Society at Reading (Thimbley & Shorland, Auctioneers), the following highly satisfactory results were obtained:—Top prices—320 guineas, the record, for one gilt bred by Julius Fricker and sold to the Wellington Live Stock Company; 225 guineas for one sow (whose dam had been sold for £150 and sire for 300 guineas when over five years old); 100 guineas and over for one boar, one sow, and two hilts; and 50 guineas and over for one boar, two sows, and two gilts. Excluding twenty-six pigs under 10 guineas the averages of four classes were:—(1) 18 boars over a year = £20, 3s.; (2) 30 boars under a year = £21, 12s.; (3) 32 sows one year and up = £40, 9s.; and (4) 32 hilts = £36, 10s.—a grand average for 112 pigs of £31. At a recent private auction sale thirty-five head made the record average of £43.

The **names and addresses of early breeders** who, on 25th August 1884, signed the Memorandum and Articles of Association of the British Berkshire Society are:—

Alfred Ashworth, Tabley Grange, Knutsford; Nathaniel Benjafield, Shortsgreen Farm, Motcombe, Shaftesbury; Heber Humfrey, Shippon, Abingdon, Berks, Secretary; John Pittman King, Rectory House, North Stoke, Wallingford; Robert Harvey Mason, Necton Hall, Swaffham, Norfolk; Alan Stewart, Saint Bridge Farm, Gloucester; Russell Swanwick, R.A.C. Farm, President of the British Berkshire Society, Cirencester.

Following are a few **leading breeders**:—

Wm. A. Barnes, Hasluck's Green, Shirley, Birmingham; Hy. R. Beeton, Hammonds, Checkendon, Oxon.; Major C. Behrens, Swinton Grange, Malton, Yorks; A. H. Bishop, Thornton Hall, by Glasgow; Earl of Carnarvon, Highclere Park, nr. Newbury; G. Culley, St Mary Bourne, nr. Andover; L. Currie, Minley Manor, Farnborough; J. Fricker, Suddon Grange, Wincanton, Somerset; Arthur Hiscock, France Farm, Blandford, Dorset; James H. Ismay, Iwerne Minster, Blandford; Mrs Jervoise, Herriard Park, Basingstoke; A. C. King, Braishfield Manor, Romsey; Lord Lee of Fareham, Chequers Court, Bucks; Lord Middleton, Birdsall House, Malton, Yorks; B. Oppenheimer, Sefton Park, Bucks; W. Howard Palmer, Stokes Farm, Wokingham; Reading Corporation, Whitley Manor, Reading; Earl of Rosebery, Dalmeny Park, Edinburgh; C. C. Smith, Kingstone Common, nr. Wantage; R. Swanwick, R.A.C. Farm, Cirencester; R. B. Vincent, Waterston, Dorset; Duke of Westminster, Aldford, Chester.

The Tamworth or **Staffordshire breed**, from the neighbourhood of Birmingham, appears to be a direct descendant of the native pig of the country. If crossed with the imported Neapolitan and Chinese pigs, which were used in the improvement, or more correctly the refinement of all the other breeds of this country, the influence of the cross has not been so distinct, as may be seen from the natural activity or restlessness of the Tamworth, the greater length of snout, and the greater tendency to grow a large proportion of lean bacon. In this respect the Tamworth resembles the Large Yorkshire and the Large Black, and in its improved form it is a favourite with bacon-curers, who object to a great proportion of fat, a heavy jowl, and excessive breadth of back. The common, uncared-for specimens of the breed are undoubtedly leggy, ungainly in appearance, and slow-maturity animals, but these defects have within the last thirty years been greatly modified, it is said, by crossing with the Yorkshire breeds. The improved pigs still retain the great length of snout and hardiness of constitution of the original breed, and are through selection attaining the power to lay on flesh rapidly. They have rather large ears, carried rigid, and inclined slightly forward, with a fine fringe; a fairly long and muscular neck, especially in the boar; strong and shapely legs with good bone, and an abundant coat of long, straight, and fine hair. The colour of the breed is reddish or chestnut, sometimes a tawny grey with black spots, but should rather exhibit "golden red hair on a flesh-coloured skin, free from black." Curly or black, or very light and gingery hair, a coarse mane, or black spots are all objections. The great function of the Tamworth breed as a bacon-producer ought to be to breed crosses by Berkshire, Yorkshire, or other early-maturity boars. By this means good pigs for commercial purposes can be secured. This is a breed which has come but recently from local obscurity into greater public favour. Separate classes for Tamworths have been formed since 1885 at the Shows of the Royal Agricultural Society.

The following are representative **Tamworth breeders**:—

C. L. Coxon, Milton, Shobdon, Hereford; E. de Hamel, Middleton Hall, Tamworth, Stafford; F. Hawkes, The Oaklands, Wooton Wawen, Birmingham; G. Houston, Wooton Green, Berkswell, Warwickshire; Robert Ibbotson, The Hawthorns, Knowle, Warwickshire; W. F. T. Jarrold, Roxley, Thorpe St Andrew, Norwich; Major J. A. Morrison, Basildon Park, Reading; B. I. Philip, The Redlands, Whitacre, Birmingham; Colonel Sofer Whitburn, Addington Park, West Malling, Kent.

BELTED BREEDS.

The Essex pig, "White-Shouldered," or "Essex Half-Black," is believed to be descended from the Old English pig described and illustrated by Low. This variety, which strongly resembles the "Wessex Saddleback," has been bred in Essex for over a hundred years, and the distinguishing points aimed at are so alike that both might have been entered in the same *Herd Book*. Owing to want of uniformity in aim in breeding, there are frequently greater differences between specimens of Essex pigs than between typical specimens of the two varieties.

The **special characteristics** of the Essex pig are its hereditary special aptitude to "an open-air existence"; its extremely hardy, sound constitution, which has enabled it to survive many adversities and the danger of extinction by crossing; its ready adaptability "to widely varying conditions of life"; its dual-purpose qualities as an excellent grazer and forager, and a rapid feeder, when kept in yards or pens to fatten; its suitability as either a porker or bacon hog, "fattening-off at any age"; the prolificacy and deep milking capacity of the sows, which are the best of mothers; its adaptability to crossing with other breeds; and finally, the admission by breeders of experience with competing breeds, that the "best strains of the Essex breed are second to none."

Arthur Young, in the "General View of the Agriculture of Essex" (1807), describes the unimproved ancestors in terms of appreciation, but "the prick-ears and short snubby nose" of that day have disappeared. Western of Felix Hall (whose breed of hogs Young pronounced to be "far the finest he had seen in Essex") wrote to Sir John Sinclair, "they are a breed pretty general in this county, but little known elsewhere. . . . There are a great many pigs bred and fattened in this neighbourhood and sent to London Market for jointing pork, weighing from six to eight or ten stones, which weight they come to at five or six months old, without putting up; they have some beans given them as they run." He further states of Waltham of Maldon's black-and-white pigs:—"They are great breeders, capable of being profitably fed to large weights, very hardy, and good grazers for marsh land."

Youatt's description of the Essex pig in 1837 was "black with white shoulders, nose, and legs." According to modern ideas the tip of the tail should also be white. In this respect it differs from the Wessex variety which has no white except in its belt and fore legs. **Lord Weston** about 1830 imported Neapolitan hogs from Southern Europe, but crossing upon the Old Essex was a failure, probably owing to too close inbreeding. Sussex and Berkshire blood was alternatively used, but improvement was probably mainly attained by selection.

Essex hogs possess superior features indicative of breeding quality, being "peculiarly distinguished by the fineness of the skin and softness of the hair," Baker of Writtle wrote in 1844, distinguishing them from the Weston and Fisher Hobbs variety as a "large description of distinct black and white colour, the space over the shoulders being for the most part white, with full hanging ears, excellent mothers, and prolific, producing from eight to fourteen at each litter; they grow quickly, and at three months old are sold for the London Market and large distilleries; at ten months old they average about 180 lb. each."

Morton states that the breed in 1875 was "up-eared," a characteristic which is now discarded. Numerous authorities referred to it as the "Essex breed," while William Dietrick in his book on Swine suggested that "the foundation stock was the Old Essex hog, which was probably developed in one of the isolated local communities."

The **Essex Pig Society** was inaugurated on 27th July 1918, at a meeting in the Institute of Agriculture, Chelmsford, and incorporated under the Companies Acts in 1920. The Hon. E. G. Strutt, J.P., C.H., was elected the first President; Vice-Presidents:—J. H. Tritton, Lyons Hall, Great Leighs, and Lieut.-Col. F. Hilder, M.P., 13 Chester Street, London, S.W.1; Ralph Matthews, Newarks, Good Easter, Chairman; and R. M. Wilson, B.Sc., East Anglian Institute of Agriculture, Chelmsford, Hon. Secretary—the latter succeeded by Albert F. White, 17 Duke Street, Chelmsford. The first volume of the *Herd Book*, dated 31st December 1919, contains entries of 143 boars and 816 sows —with a list of 109 members and also 20 breeders not members.

The Wessex Saddleback pig, also known as the "Sheeted" and "Belted" pig, one of the ancient breeds of the country, was the last to be registered. Vol. I. of its Society (incorporated June 1918) *Herd Book*, containing boars, 1 to 76, and sows, 1 to 260, was issued in 1919.

Sir Alfred Mond, Bart., contributor of £100 to the initial expenses, was elected first President; H. C. Knapman and R. E. Macan, Vice-Presidents; W. J. Malden, Chairman; H. I. Christopher, Vice-Chairman, and E. E. Ralls, Hon. Secretary, *pro tem.*, 19 Market Place, Romsey, Hants.

The first Life Governors were:—L. Cole Attril, Louis Batten, Bernard L. Braithwaite, Richardson Carr, M. Chandler, J. C. Christopher, C. E. Cross, J. E. Gabriel, F. Herrington, A. Hiscock, J. G. Kerr, H. C. Knapman, W. Nixon, G. Spearing, W. Thoday, J. T. Woolley.

Life Members:—The Earl of Normanton, Somerley, Ringwood; The Countess of Normanton, Somerley, Ringwood; Gordon H. Ball, Burcot, Wellington, Salop; Bernard L. Braithwaite, Field Grove, Bitton, Gloucester; J. R. Burge, Bushey Down, Droxford; Stanley Curtis, Plaitford, Romsey; Miss Donisthorpe, Eastington Hall, Upton-on-Severn; Mrs Ellen Downer, Gallow Croft, Ledbury; Hon. L. S. Greville, Heale House, Woodford, Salisbury; H. C. Knapman, Norman Court, Salisbury; W. J. Malden, Overton, Hants; W. Nixon, Long Ashton, Bristol; H. B. Parsons, Estate Office, Eastwell Park, Ashford; Mrs Patterson Lea, Hewshott Grange, Liphook; Ernest E. Ralls, Romsey; C. E. Warne, Weir Hill, Shrewsbury; D. Cory Wright, Red House, Westcott, Surrey.

Also forty-three Members, headed by Sir W. G. Watson, Bart., Sulhamstead Park, Reading.

When the war broke out the breed existed in thousands in the New Forest, Wilts, Dorset, Somerset, Hants, Devon, Buckinghamshire, and Sussex, but the tempting "flat" prices offered for breeding stock weighing twenty or thirty score—up to £20 and £25 each—led to such a rapid diminution of numbers that its extinction was imminent; till ultimately it was discovered that breeders generally had been yielding to the same temptation over the whole area, unknown to others in adjoining districts. The breed, it has been said, nearly "committed suicide by reason of its own good properties."

It is believed that the Wessex Saddleback was "mainly originated from the Old English pig illustrated by Low, with a slight infusion of Neapolitan" which gave it the black foundation, "the white belt being a local development," with, in a large number of cases, a black skin under the white hair. With a foreign trade to warm countries in prospect, the latter characteristic should be made a breed point. "Nearly one hundred years ago some of these pigs were exported to America . . . and under the name of the 'Hampshire Belted Pig' it is one of the prominent breeds of that Continent" with a Herd Book.

"It has long been regarded as the most valuable breed for grazing and masting in the New Forest and the districts round it. It had its origin in the Isle of Purbeck more than a century ago, but spread eastwards through the wooded country, and onwards through the New Forest, going north and westward." The features claimed for it in these districts, as the premier grazing and woodland pig, are:—Freedom from close inbreeding; great constitutional power of resisting disease and of living under adverse conditions; prepotency and aptitude to live in the open; earning its own living by "grubbing" without becoming wild, and fattening quickly on hand feeding in the sty; its high quality of meat and suitability to kill at any age or weight to be used as fresh pork or as bacon; its fecundity and suitability for crossing with other breeds; its rapid and uniform rate of growth maintained to high weights; and its being "adaptable to all classes of soil—from the chalk to the clay, from sand to peat."

This is a breed which cannot fail to grow in favour under the grazing system begun in America, and also expanding successfully in this country.

The *distinguishing features* according to the Society's standard of excellence are:—"Head and neck black, white over shoulders and fore legs, hind-quarters and hind legs black;" head fairly long and straight snout, face not more than slightly dished; ears medium size, fairly wide between, with forward pitch, sitting well, close to the face but well carried, with fine fringe of hair, not too coarse and not too papery. The action should be firm, gay, and free.

> "If you want to be in fashion, its fashion you must foster—
> Not white-skinned Yorkshire fly-traps, nor rocking-horse from Gloster—
> Not tunky[1] Berkshire dishface, nor Tamworth raddleback—
> But a sportsman with a saddle—a Wessex Saddleback."

The **Hampshire breed** in America, although only officially named in 1904, was said to have been taken out from the County of Hampshire by a Captain Mackay, but there is no doubt that it belonged to the ancestral stock from which sprang the two recently "discovered" breeds described. It found its way to the State of Kentucky, where it increased rapidly and was widely distributed under the name of the "thin-rind."

The Gloucester Old Spots.—From time immemorial there has existed in Gloucestershire, part of Wiltshire, and the North of Somerset, a breed of spotted pigs. They are hardy, prolific, grand feeders, and noted for docility. During the heyday of the production of single and double Gloucester cheese (with its valuable by-product, whey) before the development of the town fresh milk trade, in the fertile fruit-growing district of the Berkeley Valley (extending from near Gloucester to the River Avon at Bristol, and carrying a large agricultural population, "many of whom occupied small holdings or, at least, had an orchard or small paddock attached to their cottages), the Gloucester Old Spots breed was found at home, or rather the sows were, for the boars have been always located in the Village Inn or blacksmith's shop. . . . Charfield Market is situated in the centre of the Old Spots district."

This "cottager's pig," as it was called in some parts, was allowed to lie in a shanty at the end of the garden, to graze all day on the village common, and then to rear a troop of pigs, to be sold for stores to the neighbouring farmers. Such was the position in 1913, when W. Nixon, appointed Live Stock Officer of the Bristol area under the Board of Agriculture's Live Stock Improvement Scheme, recognised the exceptional merits of this old local breed, and the danger of its being bred out, as grants for boars could not be given unless they were registered. After discussion with Henry Bridgman and E. G. F. Walker, at the London Dairy Show, a meeting of some twenty local men was held in Bristol and a Society was formed, which grew rapidly. At that time £8 to £10 was a good price for any pig of the breed. Popularity spread, and prices reaching 600 guineas were paid for some prize-winners at the Royal Show in 1919. By 1921 the membership of the Society reached 1200, whilst the *Herd Book* showed entries approaching 10,000. Progress was due to the merits of the pig, which is equally good for the table as a sucking pig, a porker, or a baconer. It attains great weights at early ages, frequently exceeding 200 lb. dead carcase weight at seven months old. The breed is essentially an open-air grazing one, and breeding animals do not stand confinement —concrete floors especially being ruinous to their joints.

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[1] Tunky, a corruption of Tonquin, where early-fattening light-weight pigs came from.

In the West of England the sows are served early in September; they farrow in January. As soon as the little pigs are a fortnight old they are turned out with their dam into orchards; and they commence eating about the seventeenth day after birth. The dams are exceptionally good milkers, and if not prevented by good feeding will wear themselves down to mere skeletons. They frequently rear ten to twelve pigs, which at eight weeks old average between 70 and 80 lb. live-weight each. Some people prefer to bring in the gilts with their litters in late March or early April. From that time little or no care is taken of the brood sows as they make their own nest in open sheds or in hedgerows, and bring back the litter when a week or more old—a pretty sight a dam and her gaily spotted offspring revelling in the spring sunshine. The rather thick corky skin carries a wonderful coat of hair, which renders them proof alike against winter cold and summer heat, and sheds the rain so that pigs continue to graze in the open during the heaviest storms. In fact, in some portions of the South of England these pigs are hurdled beside the sheep on roots in the open and no supplementary food given. At the Smithfield Club Show in 1920 a pair of G.O. Spots pigs were for their age the heaviest pure breds in the show. At the Royal in 1920 Captain Brassey's "Winterbourne Blanco" exceeded 12 cwts. live-weight, the heaviest pig that has been exhibited at the Royal.

The chief points of the breed are as follow:—*Head*—medium length and width between the ears. *Nose*—wide and medium length, slightly dished. *Ears*—rather long and drooping. *Jowl*—medium size. *Neck*—fairly long and muscular. *Chest*—wide and deep. *Shoulders*—well developed but not projecting, and in line with the ribs, and must not show coarseness. *Back*—long and level. *Ribs*—deep and well sprung. *Loin*—very broad. *Sides*—very deep and presenting a straight bottom line. *Belly and Flank*—full and thick. *Quarters*—long, wide and not drooping. *Tail*—set high, of moderate size yet fairly strong and long and carrying a brush. *Hams*—large, not too flat, and well filled to the hocks. *Legs*—short, straight, and strong. *Skin*—light or dark, must not show coloured "splotches" otherwise than beneath the spots of the coat; the coat should be full and fairly thick, hair long and silky, but not curly, with an absence of mane bristles. *Colour*—white spots on black ground, or black spots on white ground, the spots of medium size. **Objections.**—*Head*—narrow, face and nose both dished. *Ears*—thick, floppy, coarse or elevated. *Coat*—coarse or curly with rose; bristly mane or decidedly sandy colour; skewbald or saddlebag markings.

The breed during the past two or three years has been exported to many places. It is doing well in Ireland, Denmark, Morocco, and Italy. In East Africa it has adapted itself to the climate. In Brazil it has been successfully used for crossing purposes. The Society make it a rule that no export certificate for the breed shall be given unless the animal has been inspected and approved by two of the Society's judges.

"The prepotency of the Gloucester Old Spots is very remarkable. A sow of any pure or cross breed mated with a pure Old Spots boar will almost certainly produce a litter of spotted pigs with the well-known type of ears of their sire. The G.O.S. have throughout their history been bred on wholly utility lines with the sole idea of producing the best class of bacon, in the most profitable manner. Notwithstanding the prepotency of pure bred Old Spots it may take a little time before all the alien blood that has, in spite of the exercise of care, found its way into the breed becomes eliminated, so that all representatives of it can be trusted to breed true to type.

The **principal breeders** are:—

E. J. Appleby, Thuraston, Rugby; Miss Behrens, Ripple, Tewkesbury; Henry Bridgman, Down-end, Cleevehill, Bristol; Rev. W. V. Chilwell, Kings Bromley, Lichfield; Webster Cory, Nutgrove, Glos.; Henry Matthews, Down Farm, Winterbourne, Bristol; Olympia Agricultural Co., Ltd., Offchurch, Leamington—Agent, W. Nixon—numbering 600 to 700; The Research Station, Long Ashton, Bristol—Secretary-Manager, E. P. West; J. Tattersfield, Lodge Farm, Faxfield, Framlingham, Suffolk; J. H. Thomas, Cudleigh Court Farm, Spetchley, Worc.; J. H. White, Bagborough, Shepton Mallet; J. Gibson Whittles, The Mount, Croxton, Stafford.

A most valuable **historical account** of pigs and their products in the early part of the nineteenth century is preserved in *A Treatise on the Breeding of Swine and Curing of Bacon, with Hints on Agricultural Subjects*, by Robert Henderson, farmer, Broomhill, near Annan.[1]

The author, a man of considerable literary ability, was a successful and progressive agriculturalist and for thirty years a breeder and dealer in swine in a large way of business for the period, and had travelled extensively in pursuit of his calling and conducted correspondence to extend his technical knowledge. Pages descriptive of the breeds of pigs of the United Kingdom are reproduced in Appendix L. Although the breeding and management of pigs was backward in many parts of the country, his own practice was notably sound and progressive. His anxiety to extend his methods and pig breeding generally was stimulated by the high prices prevailing towards the end of the Napoleonic Wars. He declares in his Introduction that:—"No sort of live-stock will, in a given time and with a small outlay, make a greater return than swine. Every man that has a house and a yard may derive benefit by having some of them, providing the number kept be not disproportionated to the means possessed for comfortably subsisting them."

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[1] Leith: printed and sold by Archibald Allardice, A. Constable & Co., John Anderson & Co., Edinburgh; John Cumming, Dublin; and Longman, Hurst, Rees, Orme & Brown, London. (2nd ed. 1814.)

He hoped to be a means of lessening the prejudice entertained against them, and of rendering them a more valuable sort of live-stock. He aimed at and advocated two litters a year (from picked sows "of the best quality, or those that are good nurses," mated to well-bred boars) timed to arrive about the first week of February and the first week of August—the latter "to avoid the approaching cold season." November was dubbed "the worst season in the year" for the arrival of young pigs. Besides the supply of newly-weaned pigs at six or seven weeks old to neighbours, there were two markets, viz. (1) Pork for pickling, from pigs weighing about 9 stones at eight or nine months old without forced feeding, "provided their bellies be always full of something," for example, raw potatoes morning and evening for a month before killing; (2) pork for bacon, from similarly reared 9-stone pigs put up to feed to the weight of 18 stones in about three months. "They consumed 1 stone of meal each besides potatoes, for every stone of pork that they increased, which was little more than 1½ lb. of meal per day." The oat and barley meal was "champed" into boiled, or, still better, steamed potatoes, and salt added. The brood sows after rearing two litters of pigs produced 24 stones of pork each, which sold at 6s. per stone. For a good many years the price of good bacon circled round 7s. a stone (the price in the present writer's recollection about 1870) up to 9s. when an exceptional rise occurred. Henderson invented a smoke-house for smoke-curing, and completing the drying process in place of the disagreeable practice of hanging dripping hams in the farm kitchen. "Juniper wood," he says, "gives bacon the best flavour; sawdust answers the purpose very well and is more easily got. The bacon and hams in Jersey and Guernsey are delicious on account of the pigs being mostly fed on fruit, and they acquire an agreeable flavour from being dried in the chimneys where the inhabitants use sea-ware as fuel."

Referring generally to the feeding of pigs, he says:—"Before going out in the morning, always give them something for breakfast, and on their return in the evening have a similar allowance in their manger. A few turnips, Swedish or common, cut into small pieces, may be given; or potatoes occasionally.

"The pigs, at the first offer of turnips, may not be so fond of them as of potatoes. Mix them, therefore, in a trough with a few oats or barley, which withdraw by degrees, and they will soon be brought to make a meal of them. They may be allowed to go upon the new sown wheat, provided the ground is dry, as their trampling is of some service to that grain. But it must then be observed, to have nose jewels (rings) well secured in their snouts, to deter them from turning up the ground.

"Swine will feed almost on any thing. In miry and marshy ground (from which they are not averse) they devour worms, frogs, rush, and sedge-roots. In drier, and in woody countries, they feed on fern roots, haws, sloes, crabs, mast, chestnuts, acorns, etc., and on this food they will grow fleshy and fat. They are a kind of natural scavengers; will thrive on the trash of an orchard, the 'outcasts' of the kitchen, the sweepings of barns and granaries, the offals of a market, and most richly on the refuse of a dairy.

"In no part of Europe is the management of these creatures better understood than in Britain, but more especially of late in Dumfriesshire."

Plate LXXXVI.B, which is a reproduction from the unnamed frontispiece of Robert Henderson's book (1st ed.), represents probably an improvement made by crossing with the Chinese the native grey pig that was at an earlier date kept in large numbers in a state of semi-wildness in the North of Scotland and (a small variety) in the Islands of Orkney and Shetland. In the latter areas, it is on record that it was covered with hair long enough and fine enough to make the ropes used to lower over the cliffs people collecting sea-birds' eggs. There can be little doubt that the large pig, probably not so highly improved as the original of the plate, contributed substantially to the London Salt Pork and Bacon Trade described in the *Survey of Ross and Cromarty* by Sir George Stuart Mackenzie, Bart. (1810). The trade seems to have developed after George Ross, Esq., of Cromarty, had built a pier there, aided by a Government grant of £7000. Ross who had "an immense fortune made in England as an Army Contractor," died in 1786 at the age of eighty-five after farming the land of Cromarty for fourteen years, and acting well the part of the local philanthropist. In one year (1807), 1550 casks and tubs containing 112 tons of pickled pork and ham and 60 tons of dried cod-fish were exported to London Market.

In *The Tales and Sketches* of Hugh Miller (1862), it is recorded that Ross set on foot a trade in pork which "paid the rents of half the widows' cottages in the country for many years, and is still carried on by the traders in the place to the extent of from £15,000 to £20,000 annually."

The same plate seems to represent what Sir George Stuart Mackenzie wrote of as pigs of "the large common breed which were generally bought up in Spring by people who cured pork in Cromarty and other places on the East Coast, no particular attention being paid to either breed or breeding; the animals generally shift for themselves and get only an occasional meal of potatoes and kitchen refuse." The grey pig which was extensively reared in Inverness, is believed to have declined and finally to have died out after the close of the Napoleonic War, when less pork was required as food for the Army and the Fleet, no longer on active service.[1] (See also Appendix M.)

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[1] In a Report of the "Historical Manuscripts Commission," 1922, the following suggestive statement may refer to one reason why the rearing of pigs declined or disappeared in some districts of Scotland:—"Many galls have byn found in the beefe caskes throughout the fleet and in some caskes of porke galls thrust into the flesh, the men have byn very much conserned at it, and thinke the papists have found means to poyson them, as I am informed." *Report on the Manuscripts of Allan George Finch, Esq., of Burley-on-the Hill, Rutland*, vol. ii., p. 243 (H.M. Stationery Office).

CHAPTER XIX

GENERAL MANAGEMENT OF PIGS

General Management — The Boar and the Breeding Sow, and their Treatment—Fattening Pigs—Shelter Sheds--Feeding—Cooked *v.* Uncooked Food—Percentage of Dressed Carcases Yielded—Food Consumed and Rate of Gain—Grazing-Pig Breeding and Management—Silage for Pigs—Ideal Pig-Camp—Edge's Patent Wire-Fence—Diseases of Pigs.

THE breeding sow should be lengthy rather than short, yet not out of proportion, and there is no objection to her being one of a first litter. She should possess the characteristic points of her breed, and, as a sucking pig, be conspicuous in the litter for size and quality. She should be of a family noted for good milking properties, as the quality of milk differs among pigs nearly as much as among dairy cows, and should possess at least twelve teats, placed at equal intervals along the belly and commencing close behind the fore-legs. When large enough to breed, say at seven to nine months old, she may be put as a hilt or gilt to a young, well-developed boar of her own age; and during her period of growth she should not be forced, but fed to develop bone and flesh. If not impregnated (in common language "missed"), she will come in season again in exactly three weeks. She remains in heat about three days, and is best served the second or third day. The condition is easily recognised by redness and swelling behind and by the animal mounting on others. A secretion of a milky appearance may be observed on the first day. A sow with large flat teats, which are invariably blind, should be rejected. Boars should not run with their sows, but be kept separate to avoid accidents and liability to exhaustion through too frequent matings. One complete service is most effective. A boar is capable of attending to at least 50 sows in the year, but instances of serving 120 to 150 a year are claimed in Denmark. Bad-tempered boars are dangerous, and should be got rid of. "A strong, vigorous boar, from one to four years old, may be fed chiefly on swill, stirred with a very little barley-, pea-, or bean-meal, twice a day. The remainder of his food may consist of grass, green clover, tares, or lucerne, or a limited quantity of cabbages in summer; and turnips, swedes, marion-kale, kohl-rabi, and mangels during the eight months from the end of August to the end of April." An excess of cabbage or of kohl-rabi is liable to produce constipation, especially in pigs that have little exercise.

Breeding swine should always be treated gently, and run out at pasture till near farrowing time to save expense, and to get plenty of exercise and abundance of green food; but richer milk-making food should be added a week or two before the litter is expected. The period of a sow's gestation is sixteen weeks. There ought to be six or eight pigs reared off the first litter, and ten, or occasionally more in each after-litter, if the sow has teats enough. It is bad practice to permit a brood-sow to suckle more pigs at a time than the number of her teats, as the weak ones are invariably kept back by the strong, and starved and stunted in growth, so that they rarely pay to feed if they live. Milk "goes away" if a teat is not required and not sucked, but it returns next time should the litter be larger. Four sharp little needle-like tusks, which appear in some young pigs, have to be broken off to prevent them injuring the teat and making the sow restless. A bad milker, or one which kills or eats her young, ought to be fattened off. Gentleness of disposition is an essential to success. Sows kept to breed pigs for fattening pay best in ordinary times if fed for bacon after the second or third litter is weaned. Pigs are usually weaned when about seven or eight weeks old, and a sow comes in season for the first time after breeding (according to condition) about three days to one week after the pigs are removed. Forty-eight to fifty weeks are thus occupied in the rearing of two litters. Although we do not advocate the practice, as it is unnatural, a sow may be made to have five litters in two years, in place of two litters in one year, by beginning to feed the young on milk at two or three weeks old, gradually thickening the milk with oatmeal porridge, and, after a little, turning the mother out during the day and feeding her liberally. She should then take the boar before the pigs are weaned, when they are about five weeks old. When milking very heavily, an animal is not in that condition in which she is most likely to come in season or conceive. October, November, and December pigs do not usually thrive so well as those born at other periods of the year.

All pig-houses should be warm in cold weather. No animal of the farm is more injuriously affected by cold or damp than the pig. Warmth may be given by placing a thatched hurdle or other warm covering 3 ft. or 4 ft. above the platform on which the pigs should lie. Sows should be managed so as to have the young born when the weather is neither too hot nor too cold, and ready to feed at the season of the year when there is plenty of food. Spring and early autumn are the usual periods, when two litters a year are produced.

A few days before farrowing, a sow should be put by herself into a sty, the floor of which is about 10 ft. square, fitted round with a strong rail or plank placed horizontally, projecting a foot from the wall, and elevated 8 or 9 in. from the floor, to prevent her lying close to the wall and smothering the young pigs by overlying them. The plank also forms a protection from cold in frosty weather. One section should be floored by a raised wooden platform of 1-in. boards to keep the bed dry. In a concrete floor, a raised area of well-formed smooth bricks, laid on the side and grouted with cement, is sometimes substituted, as concrete is cold to lie on, and if the wooden platform is not regularly lifted and cleaned underneath, the sty becomes unwholesome. The person who attends at farrowing should act with patience and gentleness, and he ought to take charge of the sow from the time she is separated from the others. The place should be well littered with straw cut into 6-in. lengths. The sow takes up straw in her mouth to make a bed within a few hours of farrowing. The operation of farrowing may extend over hours, but the sow rarely requires assistance; she is very sick and quiet, and should lie all the time. It is a rare occurrence to see a pig dropped while the sow is standing. When restless, she is very troublesome and liable to crush the young pigs. Sometimes they are put at once into a warm basket to be safer than by the mother's side. They should have a suck as soon as possible, and be watched at frequent intervals for three days. A safety-lamp may, with advantage, be left hanging at night for some time. The food of the mother should be sloppy, and for the first two or three weeks after farrowing largely composed of sharps and bran, but afterwards made more nutritious by the addition of barley-, oat-, wheat-, or rye-meal. If whey be given to the mother without being boiled or soured, it is liable to induce diarrhœa in the young pigs. Young pigs grow very quickly during the first few days. Those which maintain possession of the teats nearest the fore legs are usually the largest and strongest. Each has its own teat or teats, although they steal from each other whenever an opportunity occurs. They cannot draw milk at all times, but only when the sow permits. She then lies flat on one side, and utters intermittently a subdued grunt, while the young ones suck with an avidity peculiarly their own. When the litter is about three weeks old they should begin to eat from a trough, and be at first supplied with skim milk, gradually thickened with pollards and boiled potatoes; and the sow also requires a more nourishing diet to prevent her losing flesh. It is excellent practice to allow young pigs to escape at will from their mother through a hole in the door, and roam at large in a roomy yard, to benefit by fresh air, exercise, and sunlight, and also to feed.

The scurf which collects on the skins of pigs may be removed by washing with a mixture of one part of paraffin to eight parts of water, stirred steadily during application and not rubbed in hard. This wash destroys hog lice (*Pediculus suis*, Lin.), which resemble somewhat the common lice of sheep (p. 716), but it is liable to blister the tenderest parts, such as those behind the roots of the ears. (See Bulletin No. 69, Bureau of Animal Industry, U.S.A., 1905.)

Fattening Pigs.—A farmer or dairyman should breed his own pigs, for then he secures the whole profit and reduces the risk of importing swine fever (the bane of the pig-breeder's life), and other diseases. Before the war young pigs varied much in price—12s. to 30s., or more, at weaning—1 guinea being a good average, leaving a satisfactory profit to the breeder. During 1920 prices rose to as high as £5, 10s. at seven to eight weeks old. A pig-house to hold five or six pigs ought to have a southern aspect, and stand in a sheltered and dry position, and consist of an inner compartment and an outer court, each 8 to 10 ft. square. Six pigs of 12 stone estimated dead-weight each, have ample room to feed at one time from a trough 8 ft. long. It is better to feed in the outer court rather than under cover, as pigs then keep the place they select to lie on cleaner, by leaving their droppings in the court. There are great differences as to habits of cleanliness in individual pigs. Some deposit their solid excrement in one corner of the sty, while others drop it anywhere; but when the house is constructed on a good principle, cleanly habits are those most likely to be formed. No bedding is required if the floor be a smooth surface with a fall inside of 2 in. towards the doorway, and if it be swept out every day and periodically washed. The outer court floor should have a greater fall into a sink-hole in the centre over a covered drain if water be available to swill it daily. In the absence of an abundant water-supply, the drainage of the pig-sties should be carried off by an outside surface channel. Feeding-troughs are best made of fire-burnt clay, with a division for each pig, to prevent the weak being driven out and starved by the strong. At dairy-factories, where fifty or sixty pigs are placed in one large house and fed from long troughs, a number of weak ones are always kept back by their stronger neighbours till the others are satisfied, and in consequence do not thrive. Male pigs are castrated when about five or six weeks old and after fasting for twelve hours, but not during frost. Those for breeding are turned into a yard or field and left to grow for a few months; but all newly weaned pigs should have plenty of exercise as a safeguard against apoplexy, especially if they are undergoing forcing treatment. A sharp pointed staple made of soft iron and shaped like a hairpin is put through the gristle above the nostrils and the points curled on themselves, to prevent their exercising the instinctive habit of digging or grubbing up the surface in search of roots and the larvæ of insects. S. F. Edge recommends the addition of a swinging piece (see Fig. 45). "When a pig is agitated by hearing any of its kind in distress, as when a hog is caught in a gate, or when it is ringed or spayed, all the rest gather round it, apparently to lend their fruitless assistance, and to sympathise with its sufferings." Mangel-wurzels, turnips, cabbages, clover, vetches, green grass or silage may be given uncooked and alone, or with a limited supply of concentrated food.

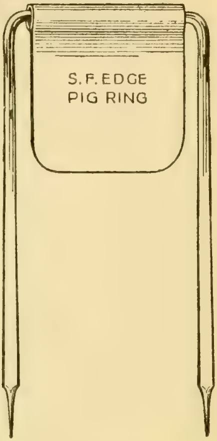

FIG. 45.

Pigs going at large, "grazing" at a considerable distance from the homestead, should be provided with a shelter shed. A convenient form is shown in the accompanying sketch (Fig. 46), capable of accommodating five or six well-grown pigs. It can be easily moved to a new site when necessary, and placed so that the one opening shall be on the lee side, to secure warmth. Another less expensive form is shaped in cross section like a triangle or the slanting roof of a house. (Fig. 47.)

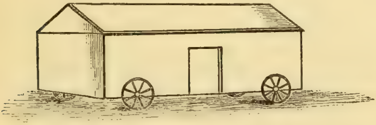

FIG. 46.—SHELTER SHED FOR PIGS. 9′ × 5′ × 3′ to the Eaves.

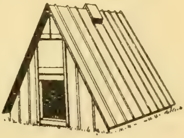

FIG. 47.—PIG SHELTER, WITH OR WITHOUT WHEELS.

Feeding.—After weaning, which should be done gradually, as before described, pigs can be fed for months on sour whey as the only food, and do fairly well. As milk in a sweet condition induces constipation, any skim-milk used should also be soured by being put into a tank or barrel tainted with the natural acidity which arises in a vessel left unwashed after containing milk. It pays well, while feeding with separated milk, whey, or buttermilk, to thicken the food with meal, which may generally be raw but which should be steamed for pigs that are not weaned. A **mixture** of meal is favoured, and may contain beans, peas, gram, lentils, vetches, wheat (including bran, germs, and pollards), barley, oats, maize, or Indiana, *i.e.*, the refuse from corn-flour works, viz., the outside or most nutritious part of the grain. The selection should depend on what possible ingredients are cheapest in the market at the time. Small and inferior grain being cheaper is usually chosen. Oatmeal is preferable for the feeding of show pigs. Costiveness is avoided by mixing bran with the food. The dung of a thriving pig should be soft and not quite formed. Roots are also frequently given, such as mangels, turnips, carrots, parsnips, as well as small potatoes and cabbages. Roots are best given uncooked, even to fatteners. A little common salt is a necessary seasoning in cooked food. "Fallen" flesh (as that of a horse or other animal of the farm) strengthens the boiled mixture and improves its flavour; but if too much flesh be used (as at a slaughter-house), or if the other foods be given without enough of meal, the pork will be soft and inferior. Leguminous seeds, especially, solidify the flesh. Maize consumed alone is in this country an unthrifty food-stuff, although when cheap it forms a suitable ingredient in a complex meal-mixture. Cooked food should be given slightly sour and cool, but not cold. Many breeders disapprove of boiling or steaming meal, and prefer to give it soaked for some hours in cold water. When there is a danger of forcing the pig to consume too much moisture, as while grazing, the meal should be given dry, even at the risk of a little waste. There is little to be gained by wetting meal immediately before use, but the practice of mixing it with pulped roots to lie from one food-time to another has given good results in winter time. Important experiments conducted in the United States and Canada have produced results decidedly in favour of uncooked food. Uncooked meal, if wetted, should be given in a much drier condition than boiled meal, else it is liable to be swilled through the stomach too rapidly. Fattening pigs are usually fed at least three times a day, but it is better to feed four times, and when they are newly weaned, five or six times daily. As much food as can be eaten at once, and no more, should be supplied. A few coal cinders, or earth, thrown now and then into the outer yard for the pigs to eat, improves their powers of digestion. Sometimes pigs are washed or brushed once a week. When kept perfectly clean they will not roll in the mire, unless for the sake of coolness in hot weather. They seem to go into mud for the purpose of cleaning themselves; the mud adheres to the skin, cakes as it dries, and in falling off carries scales and dirt with it.

The **percentage** of **dressed carcase** yielded by pigs varies considerably, and increases with age and condition. At about 100 lb. live-weight (fasted) 70 to 72 per cent. of carcase is considered normal; at 200 lb. about 75 per cent. is a fair yield, and at 300 lb. and upwards, 80 or 85 per cent. is common, and even higher yields are obtained from very fat animals. On the average, about 5 lb. of meal consumed by a pig may be expected to produce 1 lb. of increase in live-weight. Pigs are the most economical meat-producers on the farm. They consume more food per 100 lb. live-weight than either sheep or oxen, and have much greater capacity in the intestines for assimilation, although their stomachs are small. They consequently require a good proportion of concentrated and easily digestible food, although it has been recently demonstrated that they can be reared economically with a more considerable proportion of green forage than was formerly believed, and even fatten on a good pasture if supplied with a ration of cake or pulse meal to harden the flesh in the latter stage.

The following **table**[1] shows the relation between the **food consumed** and the **rate of gain**, as found from the average of a large number of American experiments:—

Weight of Pigs.	Actual Average Weight.	No. of Animals fed.	Average Food eaten per day.	Food eaten Daily per 100 lb. Live-Weight.	Average Gain per day.	Food for 100 lb. Gain.
	Lb.		Lb.			
15-50	38	174	2·2	6·0	0·8	293
50-100	78	417	3·4	4·3	0·8	400
100-150	128	495	4·8	3·8	1·1	437
150-200	174	489	5·9	3·5	1·2	482
200-250	226	300	6·6	2·9	1·3	498
250-300	271	223	7·4	2·7	1·5	511
300-350	320	105	7·5	2·4	1·4	535

The largest daily gains were given by animals between 250 and 300 lb., but the younger the animals the more economically were the gains produced.

Ordinary commercial pigs, if intensively fed and well managed, should weigh 6 stones dead-weight (at which weight they find a ready market as small porkers) when about four months old. For bacon, or for larger porkers, 11 to 14 stones is a good weight, which should be reached, by employing less intensive feeding in the early stages, at about eight months.

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[1] From Henry and Morrison, *Feeds and Feeding* (1917), p. 569.

A practical summary of the position by a man of wide Scottish experience, is given by Archie Kirkpatrick, Thornhill, N.B.:—

> "I believe in a well-matured pig for bacon curing, but I think it would be a mistake to suggest that heavy pigs. fed up to 20 stones, would be ideal, On the other hand, it would be a fatal blunder to encourage the production of light-weight porkers. My own opinion is, that a pig from 1½ cwts. to 2 cwts. is the most useful, and would best serve the dual purpose of fresh pork and bacon curing."

It is good practice, more particularly when meals and other concentrates are scarce and expensive, to run the young pigs out on pasture, grass and clover mixed, or green forage, giving them only a limited amount of meal or grain, and allowing rather more time for the animals to grow. The following is an example of a meal mixture which gives good results when fed to pigs at pasture in varying allowances per day to suit local circumstances:—Ten stones each of soya bean meal, palm kernel meal (both oil extracted), pollard and maize, with 4 stones of bran and 3 stones of dried yeast. The flesh of pigs fed under cover and in close confinement is soft and inferior, as compared with that of those which have access to open air and sunlight and opportunity for exercise, and the latter are altogether more healthy both in appearance and in reality.

The great value of the pig in farm economy is in the utilisation of light and inferior grain, of small or damaged potatoes, and of dairy by-products such as whey and buttermilk. Separated milk is frequently marketable at a better price than could be obtained by feeding it to pigs. Otherwise it forms an excellent food for them, more particularly when young. According to various experiments, from 4 to 6 lb. of skim-milk and from 8 to 12 lb. of whey are equivalent to 1 lb. of barley meal, the higher value being obtained from either when the quantity fed was limited to the necessary amount to supply moisture. The number of pigs which can be kept along with a cheese dairy of sixty cows is about seventy, if they be given sufficient meal to utilise the whey economically and to produce good pork, and if they be kept till six or seven months old.

Grazing-Pig breeding, an ancient custom revived and improved in this country, has been brought prominently to the public notice by S. F. Edge, Gallops, Ditchling, Sussex, and Dr M. J. Rowlands, Nash Farm, Keston, Kent, who have developed some interesting features in management, and also shown that it is a rural industry that is capable of being run on a moderate scale, on land of little capital value, if taken up by people of small means with a practical bent and willing to work hard and develop gradually.

The open-air life is undoubtedly the natural one for pigs: though so long bred and kept in sties, they develop in not more than two generations into hardy, healthy, grazing pigs, free from tuberculosis, rheumatism, cramps, coughs, and colds; prolific breeders requiring little or no attention at farrowing time; and able, as well as willing, to collect a substantial proportion of their daily food by grazing like sheep.

It must not be imagined, however, that they can live solely by grazing, for to give good results they require a morning and an evening meal, made up of a mixture that according to circumstances, considerations of price, and market conveniences, may contain less or more of a great many common concentrated feeding-stuffs, millers' offal, cakes, and meals (including white fish meal), bruised grains, generally "seconds" of various kinds, in proportions to supply a properly balanced ration with an albuminoid ratio of 1 : 5 for brood sows to 1 : 6 or 1 : 8 for feeders and store stock. The up-to-date practice is to mix the ingredients once a week at a central point, and distribute it to locked bins or stores at the various centres, where the pigs are fed morning and evening on the food mixture which has been steeped for twelve hours in sufficient water to meet the animals' requirements of moisture. The use of self-delivery dry-meal box-feeders[1] may come more into favour as labour-savers, but that will necessitate a regular supply of drinking water being laid on. When brought in open ditches it is a safe precaution to store it in deep and, if possible, shaded ponds, against periods of drought like the summer of 1921. When town scraps or kitchen swill is used, it is a wise precaution against swine fever to boil the stuff in a steam-jacketed cauldron, or by means of a jet of steam introduced into the boiler. Small or disease-tainted potatoes fed to young pigs ought to be boiled, but larger pigs eat uncooked potatoes with avidity, and thrive on them even when they are well advanced in decay. Silage is a valuable adjunct to a pig-grazing farm.

The numbers of pigs born, and their size and fatness at weaning, may be steadily improved by selecting breeding animals, both male and female, from the litters of sows that farrow a dozen or more, and which are also docile, careful, and attentive mothers especially just after farrowing, and feed their progeny well, in other words, are good milkers. An uncouth and unmannerly sow, or one that eats her young, should be fed-off as bacon.

In the open-air system a sow, put as a gelt to the boar at eight months and breeding at a year old, can, with proper accommodation and ordinary attention, breed all the year round and produce two litters in twelve months (or, Edge says, better in fourteen to fifteen months, weaning being delayed from the seventh to the tenth or eleventh week). She requires a water-tight hut or house like those in Figs. 46 and 47, made of wood or iron, or (for summer use) of faggots, with a wooden floor 8 ft. by 8 ft., raised a few inches above the surface-level outside, as a safeguard against flooding, and placed in a one-acre paddock.

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[1] See Appendix F 1.

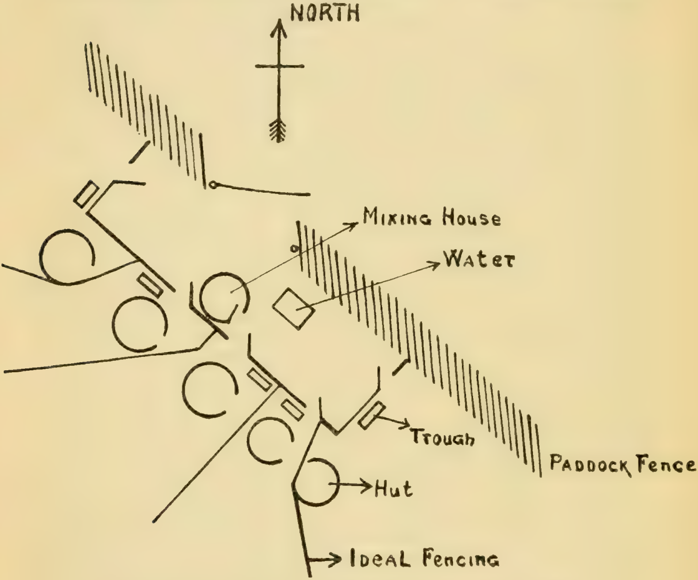

Fig. 48.—Ideal Five-Hut Pig-Camp for Labour Saving.[1]

Round huts (Fig. 48), in close proximity to the water-supply and mixing house, are placed three yards apart in a north-west and south-east line, to secure shelter and exposure to the sun, the doors all facing south-east, save one, which is north-west. The troughs are filled by a pipe through the wire fence. The floor, rough stone grouted in cement, which is wanted in the houses, is essential near the troughs. The equal divisions made by radiating fences are irregular in shape but the plan is convenient, although it involves a little extra fencing.

[1] From an article by Captain the Hon. Bertram Mitford in *Pig Paragraphs* for October 1921.

All doors must be big enough for a man to enter stooping, and have a southerly aspect, to secure the greatest amount of sunlight and heat. A roof ventilator and a divided door, half of which may be closed in cold or stormy weather, make provision for regulating the temperature—a wise precaution, although roaming pigs free to take exercise do not suffer from cold in winter as pigs confined in sunless sties with high roofs. The paddock may become trodden into a mire, especially on heavy land in wet weather, but, if pigs are provided with a dry bed free from draughts, the cold of this country, except at high elevations, does not inconvenience them.

There is no reason to fear that any of the common breeds of pigs would not make good grazers in this climate. In tropical countries where the sun is strong, white or red pigs scald and blister and cannot thrive without shade protection. This is a decided drawback, and will be against the belted pigs securing a foreign market unless a black hide under the white belt is appraised at its true value, and bred for. Where a market can be got for pure-bred stock, it will probably pay those who can afford the additional capital necessary, to run pedigree stock, even when only something like 40 per cent. of the progeny might be good enough for breeding, and the remainder have to go to the feeder. An average of ten pigs to the litter is a good result; and any of the larger breeds of pigs on the roaming system would do well to weigh 60 lb. at three months old. The average weight of litters of the whole of Edge's **Herd of Pedigree Large Black Pigs**, when weaned at twelve weeks old in 1920, were as follows:—

For May the average of all litters weaned was 62 lb. for five months.
„ June „ „ „ 58 „ „
„ July „ „ „ 57 „ „
„ August „ „ „ 54 „ „
„ September „ „ „ 54 „ „

When only commercial pigs are aimed at, crossing—for instance, between the Large Black sow and Large White boar, or the Cumberland sow and the Berkshire boar—gives very satisfactory results. Dr Rowland's objection to crossing on the plea that the progeny are slower doers, is contrary to the general rule with breeding animals on the farm.

Edge's patent wire-net fence, 32 in. high,[1] with smaller mesh and finer strands below and heavier wire with larger mesh above, has the advantage of being strong enough to stretch properly in erection and pliable enough in its lower half to follow moderate unevennesses of ground surface. (Fig. 49.)

Pigs that graze on good land growing grass, clover, and other forage crops of fine quality, require less food than on the poorer classes of soil. Open woodlands that have been partially cleared by stubbing the undergrowth supply valuable shade in hot weather and a useful variety of leaves and young shoots, until sowings of grass and clover or lucerne establish themselves under the influence of the manuring and the treading of the pigs. As pig keeping becomes better understood by farmers, and they realise the superior merits of the species for profitably turning the crude products of the farm into human food, the strong prejudice of many farmers against this branch of live stock is likely to give way, and pigs may yet help to fill the blank created by decrease in the number of sheep.

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[1] Made by U. M. I., Ltd., 22 George Street, Hanover Square, W. 1.

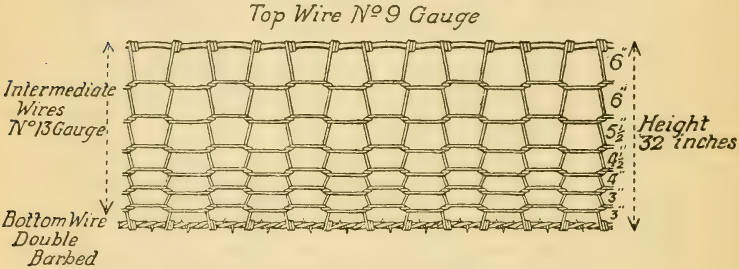

FIG. 49.—EDGE'S PATENT WIRE-NET FENCE.

Edge focuses the comparative merits of the pig as follows:—"Cattle require 13 lb. of dry food to produce 1 lb. of meat, and sheep 8 lb., but pigs require only 4 to 5 lb. Pigs make 75 per cent. of the carcase weight into good food, sheep or cattle make only 60 per cent. There is greater feeding value and energy for man in 1 lb. of pork than in 1 lb. of beef or mutton."

DISEASES OF PIGS.

Diseases are not so numerous as in the case of most animals, but pigs are much more difficult to treat when ill than other farm stock. If fat, a pig should generally be killed on the first symptoms of ailment appearing, if the flesh be fit for food, as, at the best, no improvement in condition need be expected for a time.

It is a difficult matter to administer a **drench** to a pig. A ready and simple appliance to use is an old shoe with the toe cut off, pressed well into the mouth to keep the jaws open. The drench is poured into the shoe, and passes into the throat of the animal from the opening made at the toe.

Fat pigs suffering from the **effects of heat** on the way to market are much relieved by bleeding close under the root of the tail by means of a penknife.

By improper housing, or exposure to cold and wet, pigs readily contract **rheumatism** and **catarrh**.

Diarrhœa often accompanies bad feeding. The *treatment* is, change to good food; give a purgative (Epsom salts, 3 oz.) and 5 or 6 drops of oil of peppermint.

Anthrax in pigs is the same specific deadly disease, produced by a microscopic rod-like organism multiplying in the blood, which insidiously attacks other farm animals, from eating the raw remains of which pigs usually contract the disorder. It is very sudden and fatal in its action, running its course in from a few hours to two or three days. "A rise of 3 or 4 degrees of temperature is the first symptom, followed by sudden and extreme prostration. The ears, head, and tail droop, and the animal wears a dull, dejected appearance. If made to walk, its gait is rolling and it soon becomes paralysed in the hind limbs, though it retains the power for a time of raising itself on the fore limbs. Swelling of the throat and neck follows and rapidly extends over the head and face, giving to the latter a bloated, hideous aspect." Breathing becomes difficult, and "the animal sits on its haunches with open mouth and protruding tongue, wheezing and gasping for breath, or lies prostrate." *Remedial treatment* is of no avail, but the precautions described at p. 271 should be strictly adhered to, to prevent the return of the disease.

Foot-and-mouth disease, or aphthous fever, now happily reduced in the United Kingdom to occasional outbreaks, is communicated by contact with affected animals, including cattle and sheep, to which pigs can also communicate it. Dogs, cats, ground game, rats, poultry, and human beings frequently carry the virus to healthy animals, in which the period of incubation usually varies from two to five days, although young pigs have died in eighteen hours after drinking infected milk, which is the most infective and fatal medium of communication. In the adult it is not as a rule dangerous to life, though it leads to heavy loss through retarding progress in growth and improvement of condition, but now and then it occurs in a virulent and deadly form. An eruption of vesicles or blisters may appear on the snout, lips, and feet, the hoofs are liable to slough, and for a time the animal cannot move about. *Treatment.*—Salicylic acid lotions or carbolic acid and glycerine —½ dr. of acid to 10 or 12 oz. of glycerine—are applied to the feet, Epsom salts (2 to 3 oz.) administered, and sloppy food or milk given.

Tuberculosis (sometimes appearing as scrofula in the neck glands) usually affects the lungs, and the animal dies of consumption ; but it is more liable to be generalised through a pig's body than through that of a bovine or other farm animal, and this involves a greater danger to the consumer from underdone pork than from other forms of butcher meat. The disease is oftenest seen when pigs are in-and-in bred, but it is also encouraged by exposure to cold and wet. It may be in a great measure prevented by importing fresh, healthy blood to lessen the abnormal susceptibility to the disease by strengthening the constitution ; and by taking every precaution to disinfect the sties after a case has occurred ; and by the isolation or slaughter of suspected animals. "Feeding on tuberculous-tainted offal is not an uncommon cause of the disease, as also is the giving of milk from tuberculous cows. The fact that the post-pharyngeal glands are early affected, points to contagion coming by the way of the mouth."

Protrusion of the rectum is liable to occur when flesh is too abundant in a pig's diet and in young pigs affected with diarrhœa. *The treatment* is simple, viz., to wash the parts well, and return them to their proper position ; to introduce stitches, crossing the anus from hip to hip, and to feed altogether on milk and treacle for a time.

Hog cholera or **swine fever** is an eruptive disease caused by a micro-organism possessing very considerable vitality. The temperature rises from 104° to 106°. It is the great scourge of pigs' life, not only in America but in this country. It is most contagious and deadly, the acute form among young animals generally ending fatally in about three days. In the chronic form "the animals die in from one week to three. They may, however, recover, or drag on for two months or more in an emaciated condition. The symptoms usually take four to eight days to develop after the animal has been in contact with infected animals. In countries where the disease has been long established an infected animal sometimes appears to be in normal health." Ulcers about the size of a threepenny piece are present throughout the alimentary track, "particularly round the junction of the ileum with the cæcum." Through the application of the system of stamping out by the immediate slaughter of all in-contact animals as soon as it is discovered, it was at one time believed the country would be freed from the disease, but it has proved to be a much more formidable enemy to tackle than pleuro-pneumonia or foot-and-mouth disease, probably because it is the mistaken policy of the Government in employing unqualified inspectors. Powers for doing the work are conferred upon the Board of Agriculture and Fisheries, under the Diseases of Animals Acts, 1896 and 1903. The Board is "only empowered to pay compensation for swine slaughtered when it is thought necessary to prevent the spread of the disease. Compensation is never paid to indemnify a pig-owner for the losses sustained by him by reason of the outbreak of disease amongst his swine."

It is believed by many practical authorities interested in the matter that there is not a sufficient inducement offered to those who should report suspected outbreaks of the disease, to do so without delay. It is pretty generally recognised that until a more thorough system of cleaning and disinfecting railway wagons in which pigs have been carried is instituted, the local stoppage of pig traffic from infected areas will only be partially successful. The whole system is in need of a complete overhaul if success is to be attained.

Symptoms.—In acute cases, seen often in young pigs, the patients bury themselves in the litter, huddled together, refuse food, are constipated and then have diarrhœa, and red patches appear on the skin. The temperature is very high (106-7), and death usually takes place in a few days. When the disease is not so severe the first thing noticed is that one or two animals refuse their food and are thirsty; shivering, unsteady gait, discharge from the eyes, and diarrhœa are present, while the thermometer shows a rise of several degrees. Cough is often observed, and occasionally vomiting.

There is a chronic form of swine fever seen, mostly in adult pigs, in which the symptoms are obscure. Unthriftiness, capricious appetite, constipation, and cough are what one usually observes.

Post-mortem there is found an ulcerated or necrotic condition of areas of the intestines, mostly towards the end of the small intestine and in the cæcum. Animals dead of the acute form may, however, only show an intense hæmorrhagic swelling of the mucous membrane of the intestine and of the mesenteric glands.

Treatment.—Slaughter without delay, and burn the carcases by the aid of a few ounces of liquid paraffin. Washing out, thoroughly disinfecting, and whitewashing contaminated places must be resorted to, to destroy all germs of the disease.

Prevention of Swine Fever. Immunisation with Immune Serum.—The serum is obtained by injecting a hog recovered from an attack of swine fever with virulent blood from a hog suffering from the malady. The hog so injected is then bled to death, the blood defibrinated and the serum collected. About 4 drams of this serum are injected under the skin of the inside of the thigh of the pig to be protected. Results so far are reported as being satisfactory.

Swine erysipelas or measles, produced by a bacillus, is not a scheduled disease.[1] In the mild form of rash it is not uncommon in this country. It does little mischief except in the rare instances in which it assumes, generally in hot weather, the virulent type, as in the case of the outbreak in Lincolnshire in July 1905. Then the **symptoms of serious illness in pigs** occur, viz., "rise of temperature, shivering, loss of appetite, and vomiting." Death may supervene in twenty-four to forty-eight hours, but generally a longer period passes. **Post-mortem.**—"The membranes of the stomach and intestines show red patches, and are often swollen. The intestinal glands on the membrane are red and enlarged; sometimes the surface over these glands is abraded, but the distinct ulcer of swine fever is never seen. The lymphatic glands throughout the body are swollen and red. The spleen is often enlarged. The lungs are congested." The few pigs which recover generally suffer from lameness, the result of arthritis (inflammation of the joints). Isolation and strict sanitation are essential to success in combating the disease, as the bacillus lives long in the ground. An attenuated virus, first prepared by Pasteur and Thuillier in 1882, by passing the microbes in series through rabbits, is unsatisfactory in that it is attended by considerable risk of introducing the disease among healthy pigs, and "immunity takes about a month to establish itself." By combining with it a preliminary injection of a serum prepared from a horse, that acts immediately and confers immunity for about ten days, satisfactory results can be obtained by serotherapy skilfully carried out.

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[1] See *The Report of Proceedings* of the Board of Agriculture and Fisheries for 1905, under the Diseases of Animals Acts, p. 20. Published in 1906 by Wyman & Sons, Limited, Fetter Lane, E.C.

Measly pork has no connection with the foregoing ailment, but is due to the presence in the flesh of the pig of a tape-worm, *Cysticercus cellulosus*, in the early or bladder-worm stage. In Germany and other parts of Western Europe, where pork is insufficiently cooked, tape-worm in man is a common ailment.

Seedy-cut, or a black discoloration of the milk ducts in the belly, can be eliminated from this country by systematically discarding breeding pig the progeny of which on being killed show signs of this defect.

Poisoning by common salt is not uncommon among pigs, which are peculiarly susceptible to its effects. It occurs through the admixture of brine containing salt and saltpetre with pig-swill, which produces acute gastritis. Arsenic and other mineral poisons present in sheep-dip also cause death at times.

The symptoms are—great thirst, loss of appetite, intestinal pains, paralysis across the loins, diarrhœa; the skin becoming purple; and frequently convulsions. A sedative, as laudanum, should be given if the animal be in convulsions, and whisky if it be paralysed.

The treatment consists in giving the stomach a rest from solid food, and administering cold linseed tea, or very thin well-boiled oatmeal or flour gruel. Should gas result from fermentation of the partially digested food in the alimentary canal, give a few drops of carbolic, mixed with a little glycerine, in linseed tea.

Outbreaks of diarrhœa among dairy cows are not infrequently associated with a mild form of common salt poisoning. "The occurrence of the symptoms is found to synchronise with the opening of a new pit of grains, the top layers of which have a superabundance of salt. An ounce or two of laudanum usually checks the disorder."

CHAPTER XX

THE HORSE—EXTINCT HORSES—FOSSIL HORSES—THE WILD HORSE

The Horse — Early History — Fossilised Remains — Sub-genus *Equus Asinus*—Evidence of the Existence of a South American Wild Horse — Ridgway on Horse Ancestry—Wild Horses — Piétrement and Ridgway's Books on Horse History — Classification of the *Equidæ*—Horses all from a Common Ancestry—Prejevalski's Wild Horse—Skeleton of the Domestic Horse, and Points of a Horse with Explanations—Jumping Records.

THE **early history** of the horse is written only on the pages of the rocks and of ancient deposits, if we except the pictures of horses carved by "cave-dweller" artists upon horns and antlers. Remains of the ancestor of the domestic horse have been found in the Swiss lake-dwellings, showing that it must not only have existed, but have been of service to man at a very remote period. Before the horse was captured and domesticated, he was evidently used as a source of food, as in many Palæolithic stations the bones of the horse, as well as those of the reindeer, have been found in quantity. In some of the bone deposits in France as many as 20,000 to 40,000 skeletons are represented in a single place. The primitive horse here referred to was a diminutive animal of between thirteen and fourteen hands high.[1] (See a highly speculative but interesting and suggestive paper on "The Multiple Origin of Horses and Ponies," by Professor J. Cossar Ewart, in the *Transactions* of the Highland Society, 1904.)

In North America **fossilised remains** exist of animals resembling specimens of the *Equidæ*. Ridgway[2] says:—"The lower Pleistocene of America exhibits a great variety of races ranging in size from horses far more diminutive than the smallest Shetland to those exceeding the very largest modern draft breeds, yet all these races became extinct, not surviving into the human period, as was the case in South America. The relation of these North American races to those of South

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[1] Some in the Roman period only nine or ten hands. Fifteen hands then exceptional.

[2] See Ridgway's *Origin and Influence of the Thoroughbred Horse*, published by the University Press in the Cambridge Biological Series, 1905.

America and of Asia and Africa is a subject requiring further investigation." The most ancient forms had four toes on the fore foot and three on the hind foot, all touching the ground. More recent species exhibit three toes on both fore and hind limbs, with an increase of size in the central, as compared with the lateral toes, but still all formed for action in walking. Those of a later date have the two lateral toes functionally useless, and carried up from the ground with the middle toe well developed. In the fossil remains of Pleistocene and recent times, as well as in the horse of the present day, the lateral toes are still further reduced, being represented by splint bones, which are not apparent external to the skin, or only so in the case of monstrosities which occur from time to time.

Ridgway continues:—"It is generally admitted that the ancestors of the living *Equidæ* passed from America into the Old World, for before the Ice Age it was perfectly possible for American horses to cross into Asia by land bridges in the vicinity of Behring Strait; thence they extended into Europe, and finally reached Africa either from Asia or by the land bridges which then linked Europe to North Africa." "It is believed that in the Pleistocene period Europe was inhabited by several species of horse, as Africa now possesses several species of zebra." It is of special interest to us in this country that "the Pleistocene beds of Essex yield bones and teeth of a large-headed, heavy-built horse, which probably sometimes measured over fourteen hands high. From the Elephant bed at Brighton, portions of a slender-limbed horse have been obtained; and Kent's Cave, near Torquay, has yielded numerous fragments of two varieties or species which differed somewhat from the Brighton and Essex species."

The true horse is in scientific language termed *Equus*. It is distinct from another sub-genus of the family *Equidæ*, viz., *Asinus*, to which asses and zebras belong, and which are represented by a good number of well-known genuine wild forms. *Asinus* is distinguished from *Equus* by the contracted as compared with the rounded and well-developed hoofs, by the long hair of the tail being confined to a terminal bunch, and by the absence, with a few exceptions, of callosities on the hind legs. Ewart discovered another exception to this general rule in the absence of callosities on certain of the ponies in the Western Islands of Scotland, to which he gave the distinguishing name of "Celtic."

Wild Horses.—All horses met with in a wild state are generally supposed, with one exception, to have broken away from civilisation. (The Tartar horse, for example, has been clearly traced to Russian horses which were employed in the siege of Azoff in 1657, and turned loose for want of forage.) This implies that "no horses, either wild or domesticated, existed in any part of America at the time of the Spanish Conquest, which is all the more astonishing, having regard to the favourable conditions of soil and climate, as demonstrated by the thousands of horses now ranging the Pampas of South America, all descended from seven (Andalusian) stallions and five mares introduced by the Spaniards" (1535).[1] But an amount of evidence worthy of consideration exists, which, some authorities argue, goes a long way to establish the assumption that herds of wild horses roamed over the plains of South America before latter-day communication had begun between Europe and the New World. It appears that on the **map** of Sebastian Cabot, "*Pilota Mayor*" of Charles V. of Spain, which was executed prior to 1546-47, the objects of interest discovered by Cabot in 1527 on the east coast of South America are represented by drawings. In the upper reaches of the river La Plata, which was first explored at the period referred to, the horse is given with other animals that are known to have existed in that region. It is therefore possible that herds of native horses held possession of these plains, now included in the territory of the Argentine Republic and of Paraguay, and that the last wild horses in that region were their descendants crossed with imported Spanish horses. It is regarded as improbable that in the short space of twenty years which elapsed between the discovery of Peru and the time of Cabot's explorations in La Plata, horses could have broken away in Peru and penetrated the "vast forests of the Andes" so rapidly as to reach those southern plains in time to be observed by the explorer. Youatt (1837) indicates the existence of **methods of defence** employed by these animals which we are not aware of among the descendants of horses that have broken away from civilisation. He says:—"All travellers who have crossed the plains extending from the shores of La Plata to Patagonia, have spoken of numerous droves of wild horses, three thousand in one troop, under the command of a leader, the strongest and boldest of the herd. The lion, the tiger, and the leopard (local names for inferior beasts of prey)[2] are their principal enemies. At some signal, they either close into a dense mass and trample their enemy to death; or, placing the mares and foals in the centre, they form into a ring and welcome him with their heels. In the attack their leader is the first to face the danger, and when prudence demands a retreat, they follow his rapid flight."

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[1] Ridgway, on the authority of Azara, *Natural History of the Quadrupeds of Paraguay and the River La Plata* (Eng. trans.), pp. 4-5, 18.

[2] Puma, Jaguar, Ocelot.

Professor Angelo Heilprin[1] says: "It would appear not exactly improbable, from certain references contained in old narratives, that at least in South America the animal still lingered on even after the advent of the Europeans." John Lawrence also remarks[2]: "The non-existence of the horse in America previous to its discovery by Europeans, has, however, been disputed, but I recollect not by whom or upon what grounds." In W. H. Flower's work on the Horse, an independent reference is made to Cabot's supposed discovery, which is regarded as possible in the light of the fact that forms indistinguishable from *Equus caballus*, so far as their osteological structure is concerned, "existed in America before its introduction by the Spaniards." Whether Flower's information is reliable or not "it is certain," says Professor Cope, "that man was contemporary with species of *Equus* on the North American Continent."[3]

The alleged total **extinction** of all **equine species** in America is by Ridgway attributed not to the great carnivora, but to the "insidious inroads of far meaner foes, for we must not forget that there are no feral horses in Paraguay, because a *Hippoboscus* or an *Œstrus* attacks the umbilical region of young foals, and produces ulcers, which invariably cause death unless human aid is interposed."

There are **two monumental works** on equine history worthy of special notice, one French, and the other English—*The Prehistoric and Historic Horse*, by Piétrement, 1883, and, *The Origin and Influence of the Thoroughbred Horse*, by Professor Ridgway of Cambridge, the distinguished archæologist, 1905. Piétrement maintains that the home of "the wild horse of the Old World was confined to Northern Europe and to those regions of upper Asia which lie north of the Caucasus and of the mountain range joining the Caspian Sea with the Himalayas." The plain-dwelling Asiatic horse he divided into two distinct breeds, the Mongolian, with convex forehead and low-set tail, to the east, and the Aryan "with the straight or upturned profile and tail set on high," to the west of the Altai Mountains. These horses are supposed to have accompanied the primitive Mongols and Aryans in their separate migrations—the Mongol type ultimately going with the Phœnicians to the African coast of the Mediterranean, and the Aryan type to ancient Greece, to become the Arabian Kehailan of the present day. The fact that all horses scrape with their fore feet when snow covers their food, supports

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[1] In *Distribution of Animals*, 1887.

[2] In the *History and Delineation of the Horse*, 1809.

[3] See *Wallace's Monthly*, May 1892, Rialto Buildings, Chicago, to which the Author is indebted.

Piétrement's theory that the ancestors of all the varieties of the horse of to-day came from the far North. Horned cattle do not possess this instinctive characteristic, and are consequently believed to have originated in a snowless region.

Ridgway adopts the following **Classification of the Genus** *Equus*:—(1) *Equus caballus*, the horse; (2) *E. celticus*, Ewart's Celtic pony; (3) *E. przewalskii*, Prejevalski's horse; (4) *E. kiang*, the kiang; (5) *E. onager*, the Indo-Persian wild ass; (6) *E. hemippus*, the Syrian wild ass; (7) *E. asinus*, the African wild ass; (8) *E. somalicus*, the Somali wild ass; (9) *E. grevyi*, Grévy's Imperial or Somali zebra; (10) *E. zebra*, the mountain zebra; (11) *E. crawshayi;* (12) *E. foai;* (13) *E. granti*, Grant's zebra; (14) *E. chapmani*, Chapman's zebra; (15) *E. burchelli*, Burchell's zebra; (16) *E. quagga*, the quagga, now extinct.

Darwin held the belief that all forms of horses that breed freely together and produce fertile progeny are descended from a common stock, no matter what the colour, the size, or the other external features may be, a belief which has generally and rightly been accepted since Darwin's time. It is inconceivable to think of functional identity in two such complex organisms as the procreative parts of two types of horses being maintained indefinitely when it is seen that the horse and the zebra, although also derived in a very remote past from a common parentage, are incapable of producing fertile hybrids. Darwin thought that the original colour of the wild horse was dun, but Ridgway finding no dun-coloured specimens in the superior type of Libyan bay horse, adopts the view that the progenitors of the Libyan horse had a line of descent different from that of all other horses and ponies. He even says: "It will be observed that those who hold a single origin for all domesticated horses base their belief on the fertility of the most distinct breeds when crossed. Yet this cannot be regarded as a true criterion, for animals which are admittedly distinct species, such as the dog, the wolf, and the jackal among carnivora, and the common ox, the zebu, *Bos gaurus*, and the yak, *Bos grunniens*, among herbivora, freely interbreed and produce fertile offspring." Such an unlikely suggestion is, from a practical point of view, a blemish in a book that, from the historical and archæological side of the question, must rank as the foremost work in English on the subject.

Prejevalski's wild horse, *Equus przewalskii* (Poliakof), is now admitted to be the only genuine wild horse.[1] It was heard of in the deserts of Central Asia by the famous traveller whose name it bears, and it was first described by Poliakof in

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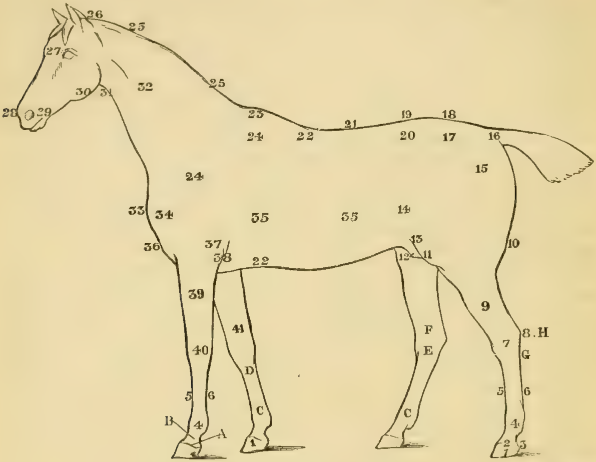
[1] In a paper to the Royal Society of Edinburgh, 6th November 1905, Ewart mentions five lumbar vertebræ in the wild horse, in place of the usual six, as connecting it with the wild Tarpan of Central Asia.

1881. Its present known habitats lie almost in the centre of Asia, in the Gobi Desert, and in a rectangular space of moderate dimensions on the north-west border of Mongolia in the vicinity of the Altai Mountains, bounded west and east by long. 84° and 90° to 91°, and north and south by lat. 48° and 46°. Four varieties of the type are reported to exist, with different shades of colour of hair. In 1902 the late Carl Hagenbeck of Hamburg (under commission for the Duke of Bedford) succeeded by the help of about 2000 Kirghis in securing 32 foals (17 horses and 15 fillies) which were reared by common Mongolian pony foster-mothers. This was the first of two consignments successfully landed in this country. The full-page Plate CI. is from a photograph, taken in 1906, of four-year-old **specimens retained at Woburn Park**, where two varieties of colouring are represented in what is believed to be one type of the breed. The head, the neck, and the back half-way down the ribs are of a russety-brown colour. A dark brown dorsal band, of varying breadth and distinctness, extends from the short upright hog-mane into the hair on the upper part of the tail. The beard or fringe under the jaw is coloured like the upper part of the body, but on the belly, thence half-way up the sides, and on the buttocks the hair shades off into a stained white. In two or three cases, stripes on the shoulders, shorter than those of a donkey, descend from the withers but incline more forward at the points. Alternate dark and light sections of the hog-mane indicate a tendency to banding on the neck. There is no forelock, only the termination of the mane appears like a peak between the ears, which are of good size but short and horselike, tapered by gracefully curved lines to a sharp point. The neck is massive and of good length, carrying a large but extremely well-proportioned and attractive head, broad between the eyes, full and square at the muzzle, which, in one of the two varieties represented, is surrounded with a mealy ring or broad rim of light-coloured short hair, with frequently a dark peak descending into it above the nostrils. A smaller number have instead a narrower tan-coloured ring, which is correlated with a darker shade in the general colour of the hairy coat.

The body is thick-set, and the back straight and strongly coupled, with deep, rounded ribs and a good heart-girth. The withers are low and the shoulders upright. The hind-quarters are extremely short, very broad behind, flat on the plate, drooping at the croup, and generally formed like those of the common donkey. The tail, with one or two exceptions, is set on low, and, the hair on the upper part of it being shed annually when the winter coat falls off, it assumes during summer the characteristic appearance of the tail of a donkey.

Both fore and hind limbs are well formed and well set on, and are furnished with chestnuts. The joints are of good size and the hocks somewhat straight. The socks and the legs are black, shading into the lighter colours above. The black hoofs are hard and durable, and resemble more the elongated hoofs of the Arab than the rounder and flatter feet of the cart horse. The action is free and springy, somewhat similar to the indiarubber-like bound of the zebra.



[D. G. Steele.

FIG. 50.—POINTS OF A HORSE.[1]

1. Hoof.
2. Coronet.
3. Heel.
4. Fetlock or Pastern Joint.
   B. The Pastern.
5. Cannon-bone.
6. Back Sinew or Tendon.
7. Hock.
8. Point of Hock.
9. Second Thigh or Gaskin.
10. Haunch or Lower Buttock.
10 to 20. Thigh.
11. Stifle.
12. Sheath.
13, 14. Flank.
15. Hip Joint.
16. Root of Tail or Dock.
17. Rump.
18. Croup or "Quarter."
19. Loins.
20. Point of Hip Bone.
21. Back.
22, 22. Girth or Chest-Measurement.
23. Withers.
24, 24. Shoulder Blade (*Scapula*).
25, 25. Crest.
26. Poll.
27. Forehead.
28. Muzzle.
29. Nostril.
30. Jaw.
31. Throat or Windpipe.
32. Neck.
33. Point of Shoulder.
34. Shoulder.
35, 35. Front Ribs and Short Ribs behind forming the Barrel.
36. Chest or Breast.
37 to 34. True Arm (*Humerus*).
38. Elbow.
39. Arm (or Forearm).
40. Knee.
41. Chestnut, Castor or Callosity.

SEATS OF COMMON DISEASES.

A. Side Bone.
B. Ring Bone.
C. Wind-gall.
D. Splint.
E. Spavin.
F. Thorough-pin.
G. Curb.
H. Capped Hock.

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[1] See *The Exterior of the Horse*, by Armand Goubaux and Gustave Barrier, translated from the French by Simon J. J. Hardger, V.M.D. (Lippincott Co., London and Philadelphia.)

In the wild state they are timid and difficult to approach, and fleet of foot to escape from danger; but at Woburn, although much more intelligent, they have assumed the confidence of domesticated horses that have not been broken.

The **skeleton of the domestic horse** differs considerably in the relative proportions of certain bones, to enable them to conform to the different kinds of work for which the different classes of horses are adapted; the general plan of the structure is the same throughout.[1] The *central spinal column* is made up of the atlas and axis (the first and second vertebræ from the head), five other vertebræ of the neck, eighteen of the back, six of the loins, five of the croup (*sacrum*), and from thirteen to twenty of the tail. All have joint movement except the segments of the croup, which are anchylosed in the adult animal. The *withers* are elevated by the upright spines of seven or eight dorsal vertebræ behind the first, the summit conforming to that of the fifth. Withers that are high and extend far back are generally associated with a good carriage of the head and neck, free movement of the shoulders, long and sloping shoulder blades, and strength in

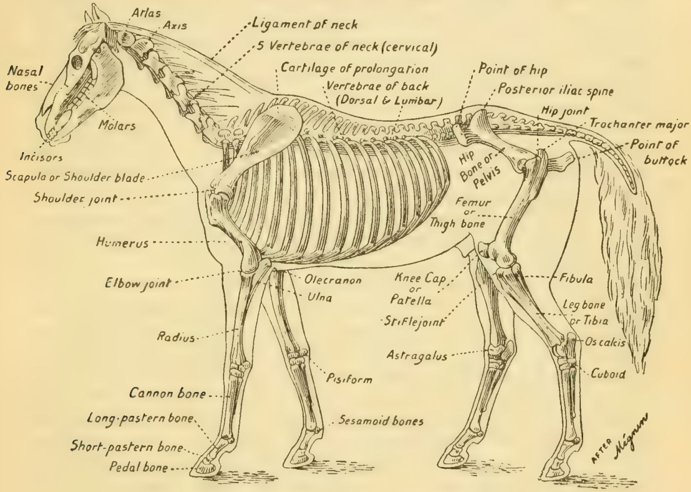

FIG. 51.—SKELETON OF THE DOMESTIC HORSE.

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[1] Based on Hayes's *Points of a Horse*, published by Hurst & Blackett, Limited, 1904.

the back and loins. It is a drawback to a hunter to be higher behind than at the withers, because too much strain is then put on the fore legs. Although the withers should be the same height as the croup in the race-horse, they may be 2 or 3 in. higher with advantage in the hunter, as this indicates a light forehand, and consequently greater facility in taking off and getting away after landing. Low withers are usually correlated, as in many mountain ponies, with heavy, short, and perpendicular shoulders. The chief function of the withers is to "afford attachment for the suspensory ligament of the head and neck, for muscles which extend the head and neck, for muscles that draw the shoulder blade forward, for the powerful muscle that runs along the top of the back and extends the vertebræ, and for a muscle which aids inspiration by bringing the ribs forward." The withers are lower in mares than in horses. Castration does not hinder their development. There are eighteen pairs of *ribs*, none attached to the fifth lumbar vertebra, but the eight *true* ribs on each side are individually connected by cartilages to the breast bone, while the ten *false* ones have only an indirect cartilaginous connection with it. [The *floating ribs* in other genera of animals have no cartilaginous attachment, see page 625.] The ribs ought to be long, to give a good depth to the body—a point of importance in all kinds of horses—and those posterior to the scapula, especially the false ribs, should also be well-arched to give ample room for the lungs. Horses with long posterior ribs are said to be "well ribbed up" — a conformation indicative of staying power. The expression "well ribbed home" implies a short space between the last rib and the point of the hip—seen in well-coupled horses. Expansion of the chest is secured during rapid breathing by the middle portions of the ribs (especially the middle false ones) being pulled forward by muscles attached to them, making them pivot round in the joints they form with the spine, and in some cases with the breast bone. The *shoulder blade* or *scapula* is a flat spatula-like bone, with a narrow ridge or spine bisecting its outer surface and dividing the muscles which flex, from those that extend, the shoulder joint. The *scapula* should be long in all breeds of horses, and lie closely and well back on the true ribs of all saddle-horses. "For safe action we should seek for oblique shoulders, sloping and long pasterns, knees in which there is no tendency to 'stand over,' and lightness of forehand." Oblique shoulders take the jar from the fore legs, but their absence may be compensated for by long and oblique pasterns. Great speed is not dependent upon oblique shoulders, as shown by deer and antelopes, which can move very quickly, though they have straight shoulders; but oblique shoulders withstand more wear in training and at other forms of hard work. The *fore limb* should be upright, so that a plumb-line suspended from the point of the shoulder would cut the front of the *coronet.* The *knee joints* of a horse that is calf-kneed or buck-kneed bend further back than the perpendicular. In reference to the *bones of the fore limb*, "the shoulder blade should be relatively long, the humerus short, the forearm long, the cannon-bone short, the pastern long," and the slope of the shoulder blade and pastern should follow parallel lines. A corresponding series of inverse proportions can also be traced in the *hind limb*, *i.e.*, "pelvis long, thigh short, tibia long, cannon bone short, and pastern long," although both hoof and pastern behind are more upright than in the forehand. Similarly, in the *longitudinal axis* of the body of the race-horse, the head should be short, neck or reins long, back and loins short, croup long, bones of the tail short. The *back and loins* behind the saddle should be wide and flat, even when the animal is in thin condition. The top line of the *croup* should always be convex, unusual straightness or concavity indicating weakness. A "*horizontal croup* and a *high-set tail* are points of beauty in the saddle-horse," and they are also indications of speed, as a horizontally placed *pelvis* permits of full extension of the hind limbs in galloping. The pelvis is a single bone in the adult animal, although it comprises two halves, each consisting of three bones (*ilium*, *pubis*, and *ischium*). Each half carries a socket for the head of its corresponding thigh bone. "The *point of the hip* or *haunch* on each side is the front and outer corner of the pelvis. Its two inner corners are firmly connected with the *sacrum*, upon which they rest. They form the highest point of the bony framework of the croup." The *posterior points* of the pelvis underlie the *points of the buttock.* For speed, the pelvis requires to be narrow when viewed from behind, and for strength and slow work, broad and massive. In a weight-carrying hunter it should assume an intermediate form. A *drooping rump*, although not to such an extent as a "goose-rump," is not objected to by many in the hunting-field, as the animal is better able to get his hind legs under him in preparing to jump, and "high-class chasers generally have the pelvis fairly sloped." The droop in the hind-quarters of the heavy farm and dray-horse, correlated with the low-set tail and comparatively short hind limbs, adds to his effectiveness at work by "tending to render the line of bones through which propulsion takes place, straighter." The relative positions of the *other bones of the hind limbs* are indicated on page 439, and each hind limb should be set on straight, looked at from behind, and so constructed that when the section between the hock and fetlock joint is in a perpendicular position, it should be in line with the point of the buttock. To secure this, the *os calcis* must be well developed. "The longer the *os calcis*, the greater will be the mechanical advantage at which the muscles of the *gaskin* will act in kicking or in propelling the body forward," the length giving increased leverage in the hind limb. Moreover, it gives a cleaner appearance to the hock, and removes a tendency to thoroughpin. It is less objectionable to have a horse's hocks *turned in* than out, as it enables him to clear the belly with the stifles when galloping. The *face* consists of the *forehead* above the lower corners of the eyes to the root of the *forelock* and the *nose*, or the continuation of the forehead to the *nostrils*. The *muzzle* is the lower end of the head. The *bars of the mouth* lie between the molar teeth and tushes of the lower jaw. The *chin groove* is the depression outside, above the under lip. The *occipital crest* is the crown of the head, and the *poll*, the space immediately behind it on the neck; the *crest*, the arch of the neck; and the *jugular* or *cervical grooves* (one on each side), the troughs running parallel to the windpipe. The *breast* is the forward part of the *chest* bounded by the *humerus* on each side and an imaginary line drawn across from the shoulder points. The *chest* is, properly, the cavity containing the lungs and heart, separated from the abdomen by the *diaphragm*. The *collar groove*, which should be hardly recognisable in saddle-horses, is the hollow on each side marking the dividing line in harness and heavy draft horses

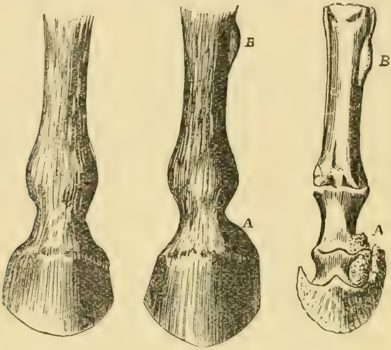


FIG. 52.—HEALTHY LEG.—A, SIDE BONE (BEHIND) AND RING BONE—B, SPLINT. After *Mégnin.*

between the front of the shoulder and its junction with the neck. The *forearm* is the part of the fore limb between the knee and the *point of the elbow* which is located below a prominent *lump of muscle* at the bottom of the shoulder. The *forehand* is the anterior end of the horse in front of the rider. The *pisiform bone* forms the lump behind the *knee joint.* The *shank*, consisting of the *cannon bone* and the outside and the inside splint bones between the knee and the fetlock, has a fibrous cord called the *back tendon or sinew* behind it. To be "tied in" below the knee or the hock is a serious defect; *knees* and *hocks* cannot be too large, if they be well formed and the bones clean. **Side bone** is the result of the ossification of cartilage, and its seat is confined to the coffin bone, or the largest bone of the foot. **Ring bone** is of a similar nature, but it ultimately involves one or both of the adjoining articulations.

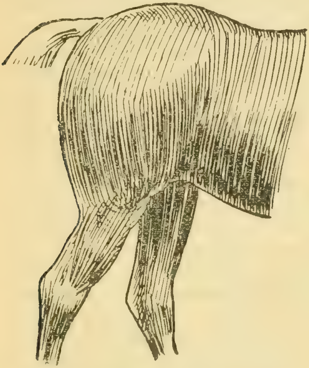


FIG. 53.—COMMON HIND-QUARTERS.

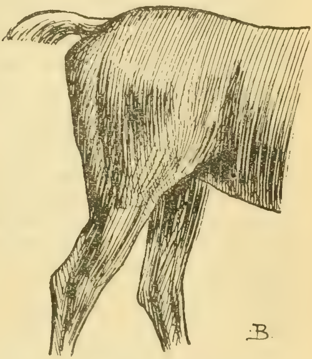


FIG. 54.—WELL-BRED HIND-QUARTERS for a Thoroughbred or Arab horse.

From Galvayne's *Twentieth Century Book on the Horse.*

Wind-galls, or **soft tares** (French, *vessigon*), in whatever site, are distensions of "articular or tendinous synovial sheaths" due, like bony tares (spavins, curbs, and side bones) to fatigue and strains which have irritated their lining membranes and caused an excessive secretion of synovial (albuminous lubricating fluid). Although not usually causing lameness when soft and not very large, they are liable after hard work to get very tense and give rise to troublesome lameness, necessitating blistering or firing. They have been known to ossify.

Bandaging is at once a prevention and a cure, and it is sometimes associated with cold-water irrigation through the hose-pipe or sea or salt-water bathing. The "Newmarket" stable bandage without seam or hem is of proper width and length, and can be conveniently used wet or dry to bandage a fore leg up to the knee joint. Smoothly and uniformly put on, it should give sufficient pressure to support the weak parts without interfering with the blood circulation.

The *hollow of the flank*, or "*melt*" *hole*, is the upper part of the flank, or the depression between the last rib and the *point of the hip;* the *belly or abdomen*, the under part of the body not protected by bones; and the *brisket*, the under part of the chest. The *point of the hip* is the anterior prominence of the pelvis, and the *point of the buttock* the posterior part of the pelvis. The *thigh* is the greater area of the *hind-quarter* in front of the buttock, and between the *croup* and the *gaskin*, or *second thigh.* The *hamstring* or *tendon Achillis* forms the posterior boundary of the gaskin or *true leg*, and unites the point of the hock with the lower extremity of the thigh. The *dock* is the solid centre of the tail. A long dock indicates underbreeding from the blood standpoint. The *height* of a horse is the distance from the crest of the withers to the ground when he stands squarely on all four legs. The *length of the body* is measured from the point of the shoulder to a line dropping vertically from the point of the buttock; and the *depth*, from the lowest point of the back, corresponding with the eighth and ninth ribs, which are the longest. "The proportion between the depth of the body at this point and the length of the body, is about the same in all classes of horses, namely, 1 to 2½ (nearly)." *Great depth* from the withers to the brisket is not a desideratum in a race-horse, as it adds to the weight without providing room for chest expansion, like roundness of rib and depth of body behind the girth. The best race-horses are often 3 or 4 in. *higher at the withers* than they are *long in the body*, and the Shire horse as much as 9 in. longer than they are high.

"The *length of the neck* indicates the length of the muscle which draws the fore limbs forward," consequently the more we want speed and clever jumping, the longer the neck should be, its thickness being limited by the amount of work the muscles have to do. A short body is desirable in a racer, a chaser, or a hunter, as it is more easily controlled by the *loin muscles*, or *rearing muscles*, situated immediately under and behind the cantle of the saddle. They are not propelling muscles, as is generally supposed, but "consist principally of those muscles that straighten the hock, draw back the thigh, and extend the vertebræ of the loins." It is for the same reason that the head, neck, and shoulders of those classes of horses should be light, although the neck should be long in proportion to the limbs. "The combined working of oblique shoulders, well-sloped pasterns, and strong rearing muscles, by preventing the forehand going down at each stride, aids in obtaining the much admired '*level' action* in the race-horse." The advantages of a lightly built forehand and absence of superfluous weight, provided there is sufficient strength in each part to fulfil its own proper functions, are equally conspicuous in horses that have to raise their bodies on their hind-quarters to jump. Hayes puts the **limit of height** for heavy cart horses at 17·2 hands, and for racers at 16·3 hands. Lower heights, that it is well not to exceed, were also stated, in spite of the admitted fact that "a good big one will beat a good little one." Without taking notice of the value of the appearance of such animals as represented by the late Sir Walter Gilbey's 17-hands hackney-bred carriage horse, shown in Plate CXXII., Hayes goes on to say: "It is no advantage for a racer, chaser, hunter, hack, or light trapper to be more than 15·3 hands, an Arab 14·2 hands, or a heavy cart horse to be higher than 16·3 hands."—So horses in England have in the average increased about 2 in. in height since the middle of the eighteenth century.

Jumping Records.—Howard Willets's American hunter "Heather-bloom" made three record high jumps that still hold the field. At a Chicago show he cleared a solid wooden rail fence 7 ft. 4½ in. high, but mended this record first to 7 ft. 8 in., and in the end to 8 ft. 1 in. Major Peel's "Chandler" is said to have made the long jump record of over 38 ft. at Warwick in the seventies of last century, beating the record of 37 ft. 5 in. over a marl pit made in 1857 by Lord Ingestre's "Leather," with the Patchley Park hounds, and another record of 36 ft., over water with a stiff hedge on the take-off side, made by "Emblem" in 1863, in the Birmingham Steeplechase at Sutton Coldfield. "In the Curraghmore Plate Race (1880), 'Woodbrook,' bred by the late Marquis of Waterford, cleared 35 ft. over the post and rail and bush fences"; and on "Poulaphonca," a Grand National winner, the Marquis, riding 18 stones, cleared 26 ft. with the Quorn Hounds on Ragdale Bottom. Arthur Hanbury's "Sir Massenberg," 17·2, at Earl Rosslyn's Point-to-Point in Fife about 1894, jumped 37½ feet over a gully and a stone wall 4 feet high on the landing side.

CHAPTER XXI

FARM HORSES—CLYDESDALES, SHIRES, SUFFOLKS, AND PERCHERONS

The Clydesdale—Origin and History—Introduction of English Blood—The Clydesdale and Shire Types of One Breed—Should be combined in One *Stud Book*—Noted Clydesdale Sires—The *Stud Book*—Points of the Breed—List of Prominent Breeders—**The Shire**—Origin of Name—History—The *Stud Book*—Points—Select List of Shire Studs—**The Suffolk**—History compiled by "The *Stud Book* Society"—General Characteristics—List of Prominent Breeders—**The Percheron.**

BRITISH Work Horses are usually classed as belonging to three breeds, the Clydesdale, the Shire, and the Suffolk. A few Percherons have recently been introduced. (See Appendix A—" Live Stock Societies—Horses.")

THE CLYDESDALE HORSE.

History.—The Clydesdale, like most of our present-day breeds of live stock, is the result of the successful union of selected specimens from various early breeds, none of which possessed the degree of merit that has been attained by the modern Clydesdale. The improvement has been effected mainly by careful and continuous selection, without resort to close in-breeding. In a draft animal the value of constitution is so great that in-breeding from anything but the most robust specimens would be likely to do more harm than good, and breeders have probably been wise in rejecting the methods of Bakewell and the early Shorthorn men. Line breeding, however, has been widely practised, and matings of the cousinship degree of relationship have been common.

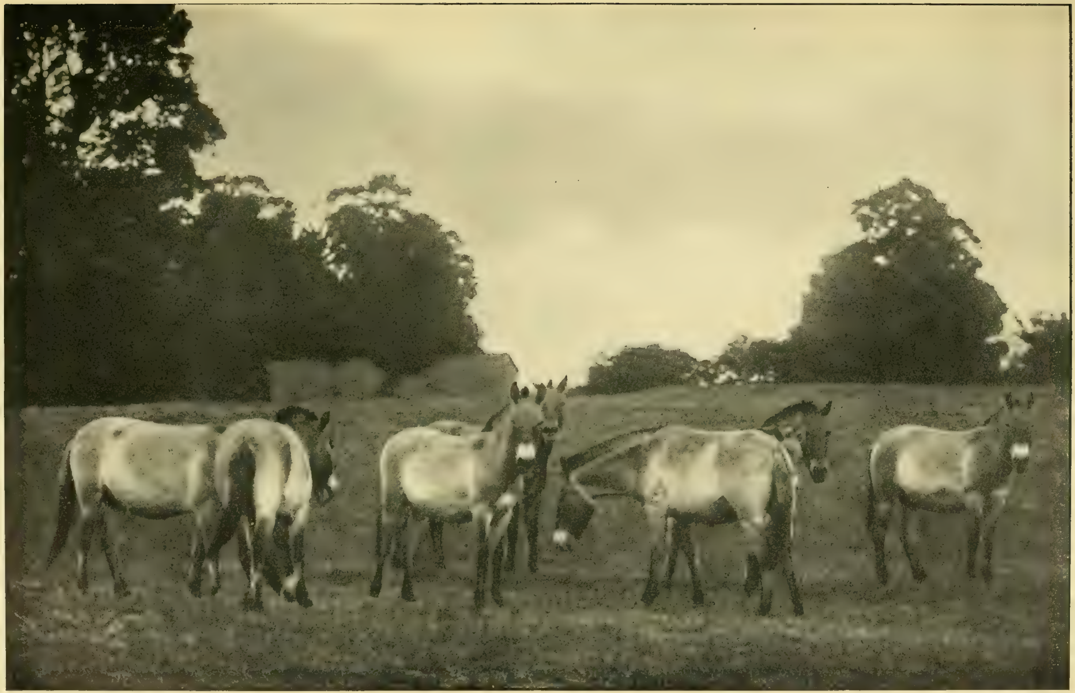
Touching the origin of the breed, little credence is now given to the story told in 1810 by Aiton of Strathaven (who himself doubted the accuracy of a report which he merely chronicled) to the effect that "one of the Dukes of Hamilton imported from Flanders, about the middle of the seventeenth century, six fine black stallions, which he kept at Strathaven Castle for the use of his tenantry and vassals." It would seem that Clydesdale, or more accurately, the Upper Ward of Lanarkshire, which can fairly claim to be the home of the breed, has long been famous for its powerful draft horses. We can, however, form no very clear idea of their characteristics as they existed previous to the eighteenth century; that they were to a considerable extent of English origin seems probable from the following facts. After the Union of the Crowns in 1603, an important droving trade in cattle and horses sprang up between the two countries and continued for over two centuries until checked by the development of the railways. The Scottish drovers, after going South with their herds of store bullocks, frequently brought back with them choice specimens of English colts and fillies. Thus the original stock of the country, before the name Clydesdale began to be used with reference to the breed, came to be blended with the blood of these English animals, some of the ancestors of which had again doubtless been imported, perhaps a century before, from the Continent of Europe.

The real origin of the breed may be said to date from about 1715 or 1720. There is definite evidence that about this time John Paterson of Lochlyoch, in the parish of Carmichael, "went to England and brought from thence a black Flemish stallion, which is said to have so greatly improved the stock in the Upper Ward as to have made them noted all over Scotland." Between 1750 and 1820 the Lochlyoch mares were in very high repute, and Paterson's strain was regarded as the fountain-head of the best blood. The splendid success as a sire of the Lochlyoch Black Horse is strong presumptive evidence that the mares to which he was put were nearly enough related to him to prevent the appearance of that tendency to variation which accompanies the crossing of animals of different breeds. Thus, although the credit of establishing the Clydesdale is now generally given to this animal, it is probable that he was merely one of many of a similar kind, regarding the rest of which no record has come down to us. But for the fact that the Paterson family possessed the then rare custom of recording important events in writing, we should probably have known as little of the Lochlyoch Black Horse as about his presumptive time-fellows. The **Lochlyoch mares** are described in the *Stud Book* as having been "generally browns and blacks, with white faces and a little white on the legs; they had grey hairs in their tails, occasional grey hairs over their bodies, and invariably a white spot on the belly, this latter being recognised as a mark of distinct purity of blood." This, no doubt, gave rise to the impression that a pure Clydesdale ought to possess a white mark, however small. It is interesting to note that white hairs appear scattered throughout the dark coats of many of the best Clydesdales of the present day.

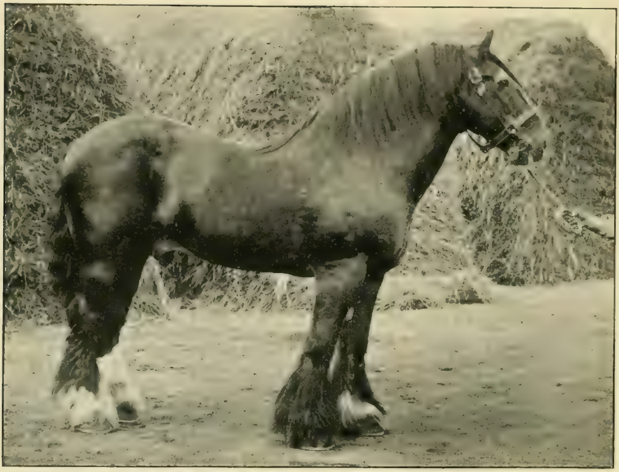
Another early sire that is said greatly to have improved the stock of the Upper Ward was the black horse "Blaze," foaled about 1780, which belonged to Scott of Brownhill, Carstairs. He is described as standing about 16·1 hands high, and as possessing such stylish action that he was generally believed to carry coaching blood in his veins. As his pedigree is quite unknown, this must remain a matter of conjecture. The most noted stud during the early years of the nineteenth century was that of Somerville, of Lampits Farm, Carnwath, the breeder of the famous "Glancer" alias "Thompson's Black Horse" (335) foaled about 1810. "Glancer" was almost certainly from a mare that belonged to the Lochlyoch strain, but beyond this nothing is known of his pedigree. He is said to have been "a very complete horse in all his points except his hocks, which were considered to be a little full." Both hind legs were white, and "his clean sharp bones were fringed with nice flowing silky hair." "Glancer" was the progenitor of a long line of famous sires, and it is safe to say that every Clydesdale now alive traces back to him along several different lines. Among the more noted of his descendants were his great-grandson, "Broomfield Champion" (95) foaled about 1831, and the latter's son "Clyde" alias "Glancer" (153).

About, or somewhat before this period, the Clydesdale began to spread to districts beyond its original home, mainly by the use of Lanarkshire-bred sires. Ayrshire would seem to have been first invaded; Galloway, Kintyre, and the county of Banff soon followed. Each of these districts developed a strain of Clydesdales of its own, and those of Kintyre and Galloway in particular had become famous by the middle of last century. In 1845, Low wrote that the breed "had spread over the whole lowlands of Scotland from Caithness to the Solway Firth, and had been mixed in blood with all the other varieties." Continuous grading has now stamped the Clydesdale character on all the draft horses of Scotland. The breed now predominates in the three or four most northerly counties of England, as well as in Ulster and the North of Ireland generally. The greatest breeding districts at present are Central and South-Western Scotland, Aberdeenshire and the adjoining counties, and Cumberland.

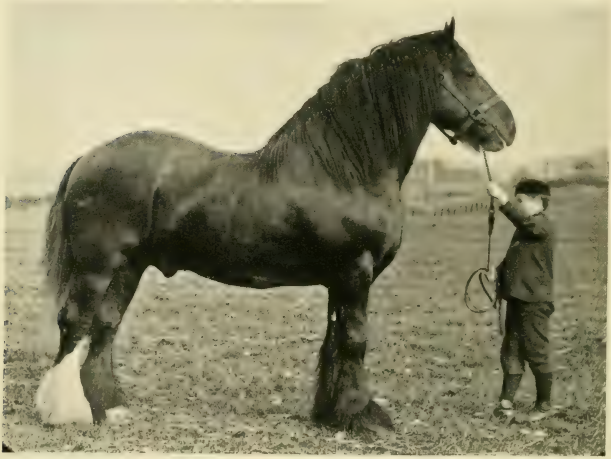
A considerable impetus to the breeding of good Clydesdales was given when the Highland Society began in 1827 to hold open Shows and offer premiums for horses. One of the Society's rules was that all horses, to be eligible to compete, must be either "black bays or brown bays." Frame of Broomfield, one of the most successful stallion owners of the day, set an example, which many breeders followed, of castrating all grey colts, thereby greatly reducing the number of grey horses in the country. The embargo on grey has long been removed, but grey, in common with chestnut, is still regarded with disfavour.



Prejevalski's Wild Horses, Woburn Park, caught in Central Asia.
Imported with Mongolian foster-mothers through Russia. Photo presented to the Author by His Grace the Duke of Bedford.
(Frontispiece of the 4th Ed.)



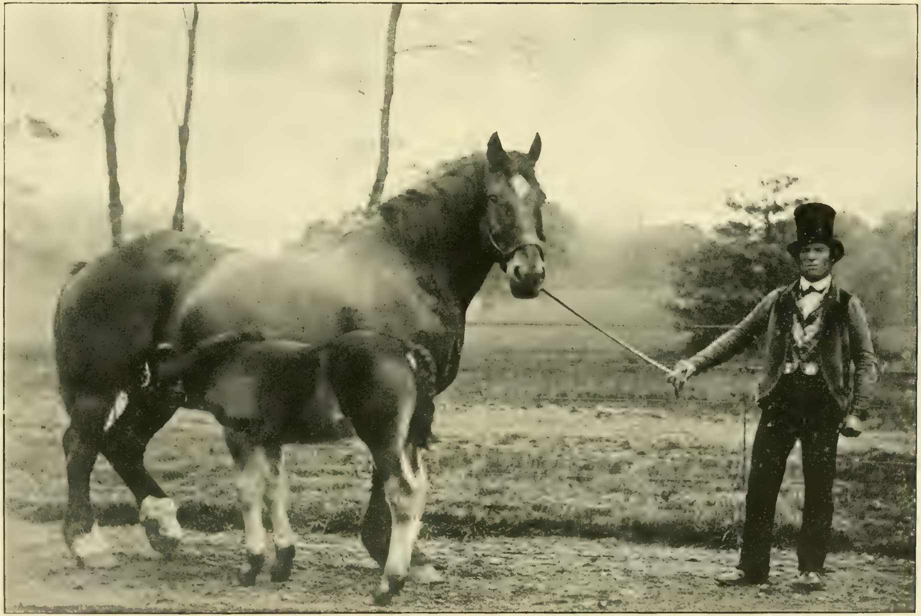
A. Clydesdale Stallion, "Prince of Wales" (673).
Famous horse, foaled 1866. First at the Royal and the Highland in 1869, and First at Kelso in 1872.
For further particulars see page 450.



B. Clydesdale Stallion, "Darnley" (222).
While the property of David Riddell, won the Highland Society and the Clydesdale Horse Society Championships in 1884, etc.
Bred by Sir Wm. Stirling-Maxwell, Bart. See page 451.

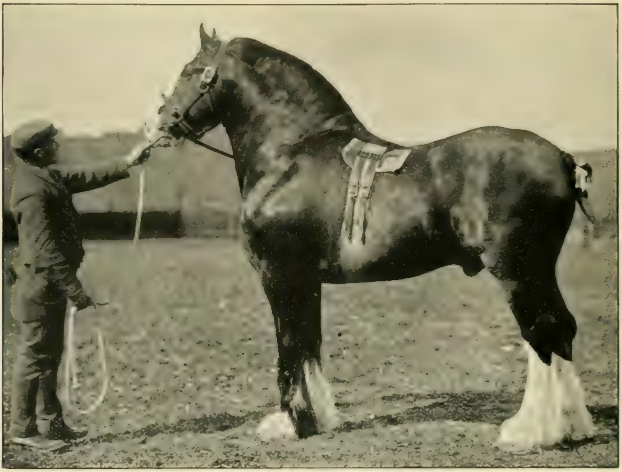
[*Both by C. Reid, Wishaw.*

PLATE CIII.



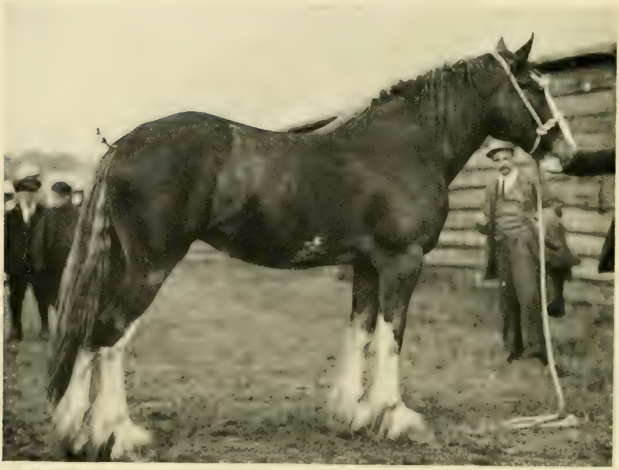
Clydesdale Mare, "Sally," with Colt Foal by "Britain," from a Royal Stud.
Typical specimens of the breed in the middle of the nineteenth century.

PLATE CIV.



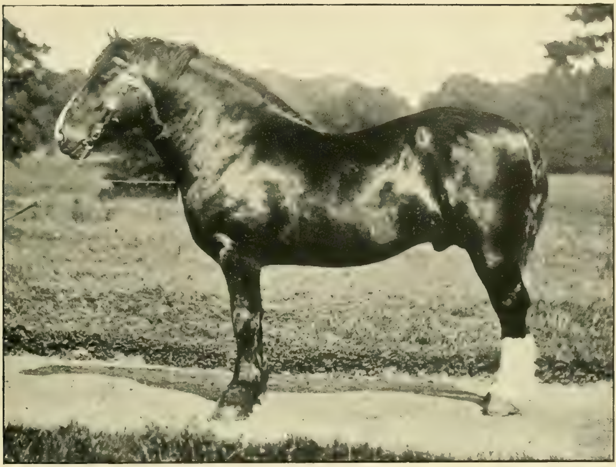
A. Clydesdale Stallion, "Baron's Pride" (1922).
Said to be "the greatest Clydesdale sire that ever lived."
The property of Andrew Montgomery, of Netherhall, Castle-Douglas.

[*Brown & Co., Lanark.*

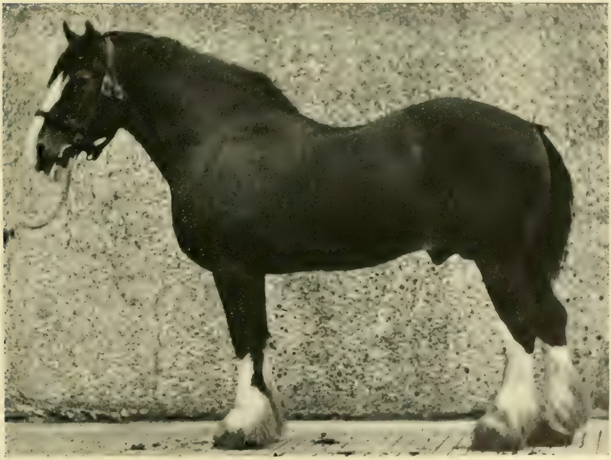


B. Clydesdale Filly, "Harviestoun Felicia," at 2 years.
Second at Darlington Royal. Owned by J. E. Kerr.

[*"Agricultural Gazette Photograph."*

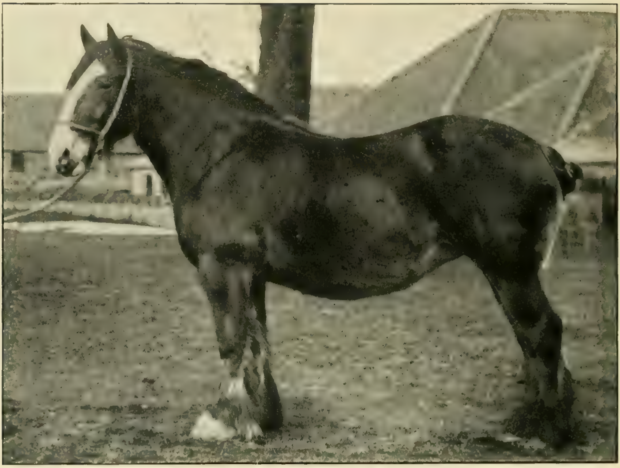


A. CLYDESDALE STALLION, "BRITAIN," from a Royal Stud.
A typical sire and prize-winner in 1854-56.

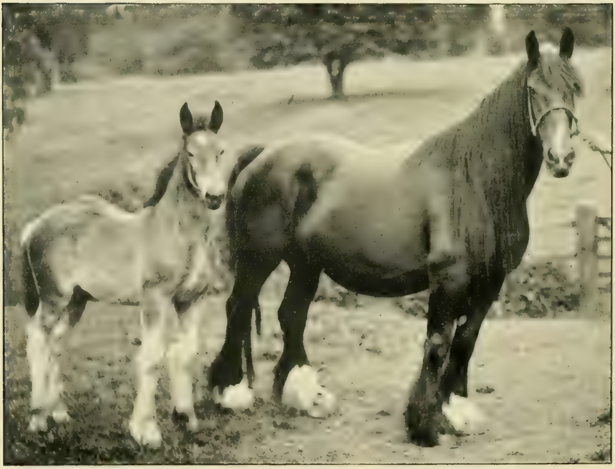


B. CLYDESDALE STALLION, "AUCHENFLOWER" (at 18 or 19 years old).
Grandsire of "Dunure Footprint." Owned by W. Dunlop.

[*"Agricultural Gazette Photograph."*

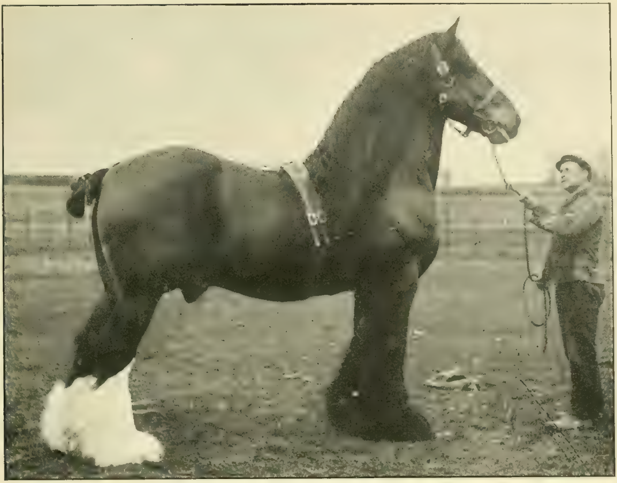


A. CLYDESDALE MARE, "MOSS ROSE" (6203).
A famous brood mare and prize-winner.
The property of the late Sir John Gilmour, Bart., of Montrave, Leven.

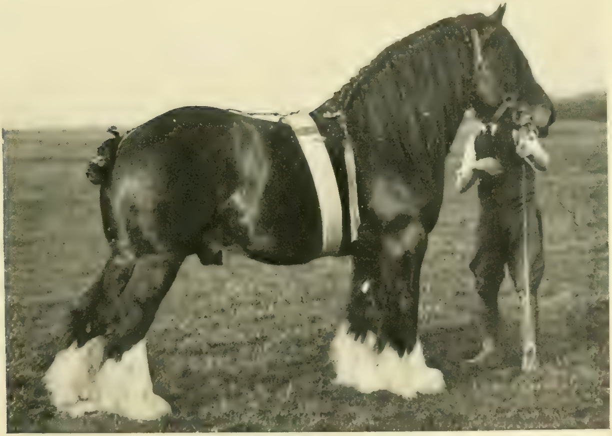


B. SHIRE MARE, "LOCKINGTON BEAUTY," AND FOAL, "MERVEILLE."
"The most extraordinarily successful brood mare yet known in the Shire world."—*L. S. J.*

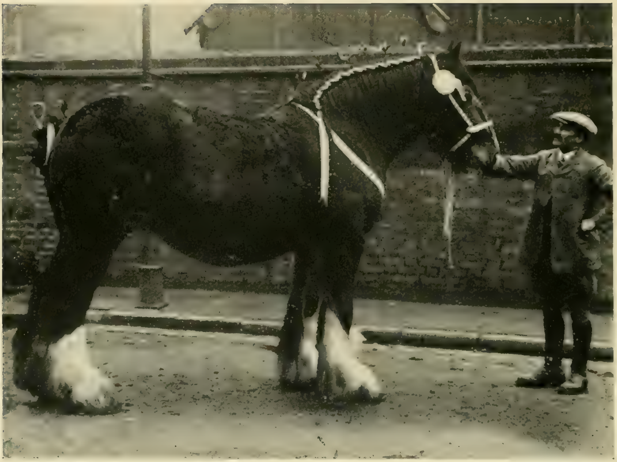
[*Both by C. Reid, Wishaw.*



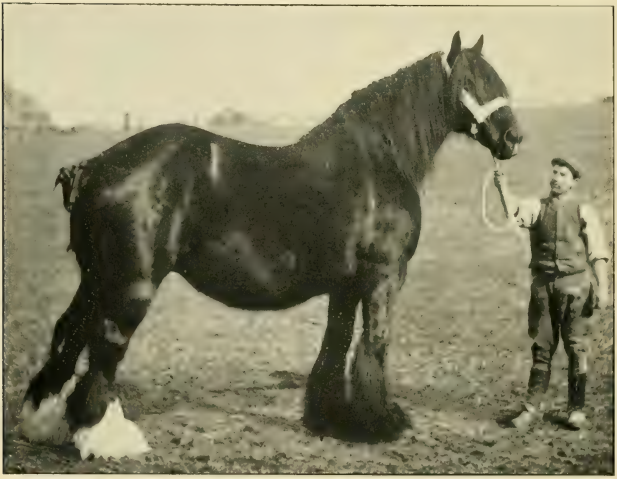
A. SHIRE STALLION, "MARKEATON ROYAL HAROLD."
Champion at the Shire Horse Show in 1897.
Owned by Sir Alex. Henderson, Bart., Buscot Park, Berks.
[*G. H. Parsons, Alsager, Cheshire.*



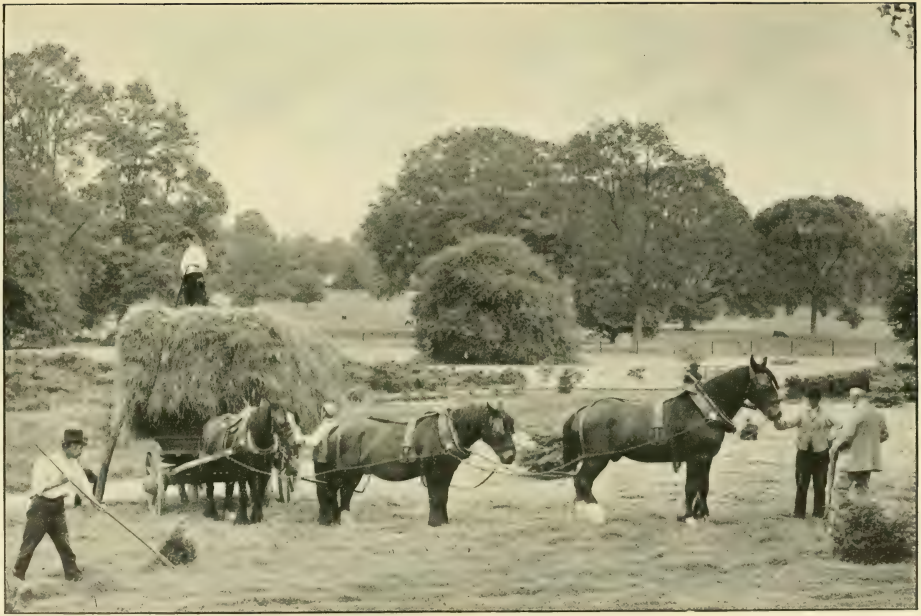
B. SHIRE STALLION, "BORO' CLANSMAN."
Owned by F. W. Griffin, Peterboro'.
[*"Agricultural Gazette Photograph."*



A. SHIRE MARE, "PENDLEY LADY."
First and Res. Special at the Shire Horse Show, 1922. Owned by F. S. Freckleton.
[*"Agricultural Gazette Photograph.*

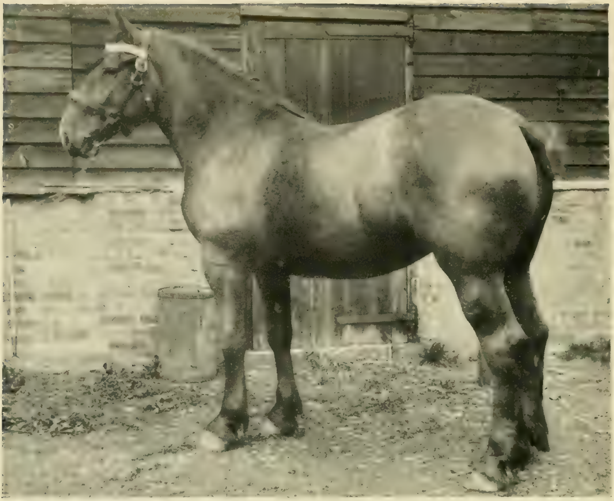


B. SHIRE MARE, "PRINCESS BERYL."
First and Champion at the Shire Horse Show, London, 1905.
[*G. H. Parsons, Alsager, Cheshire.*

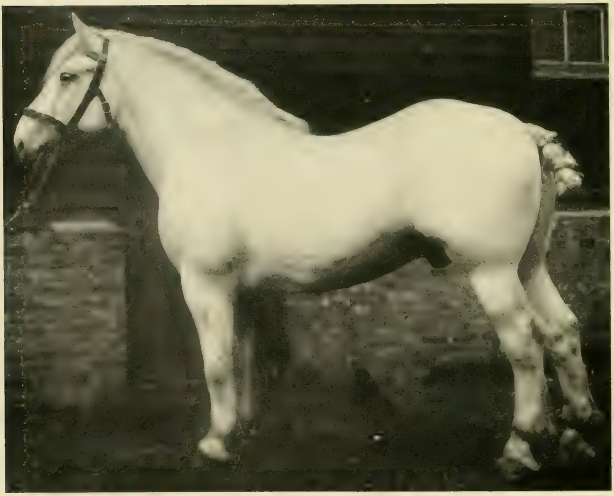


Shire Horses at Work. All pedigreed prize-winners.
The property of the late Baron Redesdale of Redesdale, Batsford Park, Moreton-in-Marsh.
(Frontispiece, 3rd Ed.)

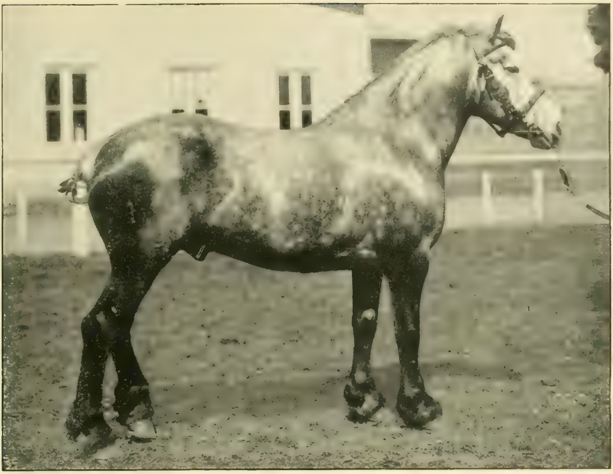
[*C. Reid, Wishaw.*



A. Percheron Filly, "Brampton Diana" (B. 273), at 2 years. Foaled 1920; sire "Misanthrope" (B. 5), dam "Quartelette" (B. 19).
First as yearling R.A.S.E. Show, 1921; First as 2-year-old, R.A.S.E. Cambridge, 1922, and Champion.
Bred by Henry R. Overman, Brampton Ash, Market Harborough.

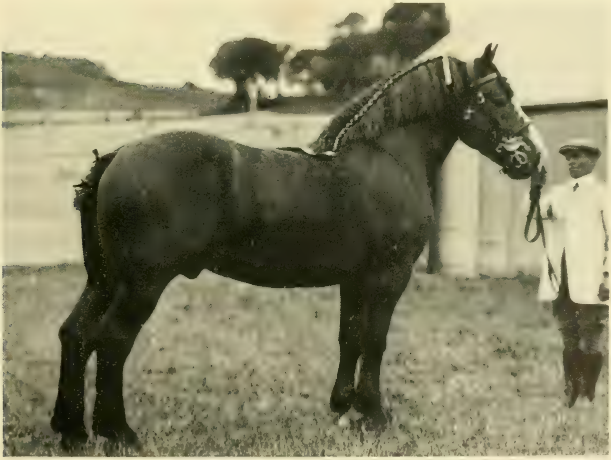


B. Percheron Stallion, "Lagor" (B. 1). Foaled 1911, imported;
First and Champion, Nogent-le-Retrou, 1914; First, Paris, 1914;
Res. Champion R.A.S.E. Shows, Darlington, 1920, and Derby, 1921.
Owned by Henry R. Overman, Brampton Ash, Market Harborough.



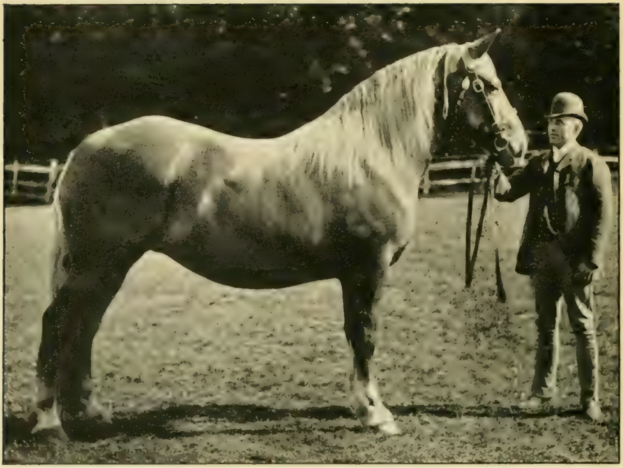
A. PERCHERON STALLION.
To illustrate the type from which, on one side, the Highland Garron (Plate CXXXVIII.) no doubt sprang.

[*From the Author's "Argentine Shows and Live Stock,"* 1904.

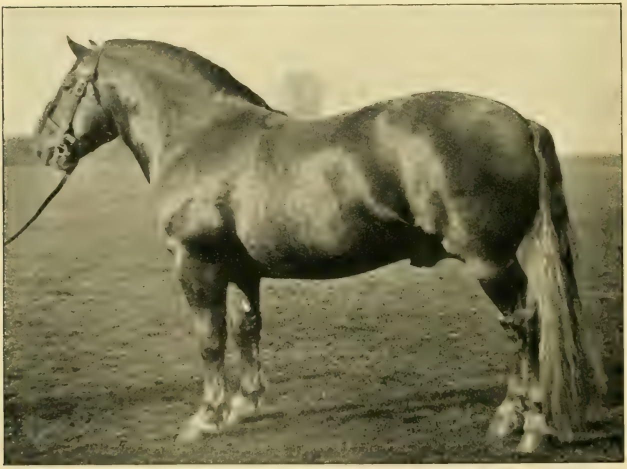


B. PERCHERON STALLION, "QUAPULET." Foaled 1916.
Owned by Hache Stud Farm.

[*"Agricultural Gazette Photograph."*



A. Suffolk Punch Filly, "Queen of Trumps" (2702).
First Prize (£15,) R.A.S.E. Show, Warwick, 1892.
The property of the late Duke of Hamilton and Brandon, Easton Park.



B. Suffolk Punch Stallion, "Wedgwood" (1749).
Queen's Gold Medal and Champion Prize for Best Suffolk Stallion at Windsor Royal Show, 1889.

Importations of English blood into the breed are not entirely a matter of ancient history. The Appendix to the (first) retrospective volume of the *Clydesdale Stud Book*, published in 1878, gives particulars of about thirty English stallions which travelled in Scotland between the middle of last century and that date. The names of many of these occur in modern pedigrees, the most important being probably Proudfoot's "Emperor," which travelled in Annandale; Hendrie's "Farmer's Glory," that was largely used in Ayrshire; and Galbraith's "Tintock," which travelled in Strathendrick and won second prize at Glasgow Stallion Show in 1876. "Tintock," particularly, left a number of excellent stock, more especially females.

Lawrence Drew of Merryton, Hamilton, between 1870 and his death in 1884, made a very noteworthy and so far successful attempt to combine the best points of the Shire and the Clydesdale in one breed. He brought from England a number of Shire mares, selected with great care for the special purpose that he had in view, and mated them with his noted stallion "Prince of Wales" (673). In this way he bred many animals that won the highest honours at Scottish Shows. Among the half-breds, or first crosses, the stallion "Prince of Avondale" was outstanding; many judges in fact considered him the finest show horse that had been seen up to his time. Others of great merit were "Bonnie Prince," a full brother to the last; "Prince of Albyn"; "Prince Imperial"; "Prince George of Wales"; and the famous show and breeding mare "Pandora," the last, however, bred after Drew's death, and by "Darnley" (222). Of the next cross, or three-parts-bred Clydesdales, the best known were "Castlereagh" (10324) by "Darnley"; "Mains of Aires" (10379) by "Prince of Wales" out of "Pandora"; and the mare "Sunray" by "Prince of Avondale" out of a "Darnley" mare. These animals were eligible at the time for registration in the *Clydesdale Stud Book*, and thus provided the infusion of Shire blood into the breed. It is a matter for speculation whether, if Drew had lived to continue his work for some years longer, he would have convinced the general body of Clydesdale breeders that his principles were sound. At all events he failed in this, and since his time the breed has been practically free from any fresh introduction of Shire blood.

The rational view to take of the position, after setting aside all narrow prejudices of nation or of breed, is to regard the heavy draft horses of England and of Scotland as only different types of the same breed. The differences between the two amount to nothing more than what may appropriately be covered by the term "different type." They are far less, to take an example, than those that distinguish the Scotch Shorthorn from the dairy strains of the same breed. It would be in the best interests of all concerned, if this were freely acknowledged, and the separate *Stud Books* merged into one, or opened to receive more easily entries of either kind.[1] It is obvious that without the union of the *Stud Books* the blending process could not be remunerative, for the produce would not be accepted as pure bred, and would not be taken by overseas buyers, who are now important factors in the market for pure-bred stock, and invariably require a registered pedigree.

The advantages of allowing breeders a free choice from either type would be great. For many years the showyard fashion in Clydesdales has been running in the direction of superlative quality of bone, sloping pasterns, large feet and close straight action (admittedly good in themselves) and neglecting the no less important qualities of depth of rib, width of body, and weight of muscle. An important section of breeders are, however, beginning to make a stand for a truer cart horse type, and these would obtain, in selected Shires, just the material they require. Shire men, on the other hand, would be able to improve their horses in respect of wearing qualities and activity, in which the Clydesdale is superior.

The history of the breed from the beginning of the *Stud Book* era in the late seventies, resolves itself largely into a record of the influence of a comparatively small number of leading sires. "**Prince of Wales**" (673), foaled in 1866, was got by "General" out of "Darling" by "Samson," his parents having been mated at the Highland Show at Inverness in 1865, where they were both first prize winners. Both the "Prince's" grand-dams came from south of the Border, but it is probable that they were Clydesdales, or at least more Clydesdale than Shire. He won the highest honours in the showyard, including first at the "Highland" and "Royal" Shows in 1869, and first at the "Highland" again in 1872. He was a horse of good size and of magnificent action, but his hocks were too straight and not over clean, and he had a "sour looking" head and a Roman nose, characters which he transmitted to many of his progeny. Of his success at the stud while in the hands of Lawrence Drew something has already been said. The high value that was placed on his stock can be gauged by the fact that in his latter years at Merryton his service fees amounted to the then unheard of sum of £40. In spite of such facts it must be admitted that the "Prince's" stock were of very unequal merit; moreover, some of the very greatest show horses among his sons, such as "Prince of Carruchan," "Prince of Albion," and "Prince of Kyle," were rather disappointing at the stud. At the Merryton dispersion sale, when he was eighteen years old, "Prince of Wales" was bought back by his previous owner, David Riddell, for 900 guineas.

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[1] The present registration rules require three crosses of registered blood in the case of the Clydesdale, and four crosses in that of the Shire. The suggestion is made that these rules be so relaxed as to allow registration in the *Clydesdale Stud Book* of animals, with say two crosses of registered blood, *provided that the foundation were a registered Shire*, and *vice versâ*.

The horse that was destined to make by far the greatest permanent impression on the breed was "**Darnley**" (222), bred in 1872 by Sir William Stirling Maxwell of Keir, Dunblane. "Darnley" was a true bred Clydesdale, his pedigree tracing back along every line, with one doubtful and far back exception, to the old Lanarkshire blood. In the hands of David Riddell, who acquired him as a three-year-old, he won first place at the Highland Society's Shows in 1877, 1878, and 1884, as well as numerous other honours. "Darnley" showed excellent quality of bone, with almost perfect feet and pasterns, and was a wonderful walker, moving with a long, free, easy stride. He showed a certain lightness of thigh, and his trotting action, particularly in front, was defective. His reputation as a breeder came slowly, for his stock, like himself, were late in reaching maturity. But they eventually proved their excellence, and were far more uniform and truer to type than those of "Prince of Wales." They constituted as a class by far the finest combination of substance and quality that had been seen up to their time. On the whole, "Darnley's" daughters were better than his sons.

Among the latter, three are worthy of special mention. The greatest as a show horse was probably "Flashwood" (3604) which, however, was a pronounced failure at the stud. "Macgregor" (1487) a full brother of the last, enjoyed a great reputation during his life-time, and undoubtedly left much good stock, females particularly. He himself, however, and the general average of his progeny were undersized, and it is questionable whether in the long run he did very much good to the breed. The third, "Topgallant" (1850), was a large and weighty horse that scarcely attained the showyard standard of quality, and died before his value was discovered. His main influence was exerted through his son "Sir Everard" (5353), the horse that "saved the breed" as regards the maintenance of size and true cart horse type. "Sir Everard" stood over 17·1 hands high, girthed in ordinary condition over 8 ft., and weighed 2324 lb.; he had magnificent shoulders, back, and ribs, and was all over a wonderful specimen of a cart horse. Moreover, most of his progeny inherited his good qualities. It was, however, as the sire of "**Baron's Pride**" (9122) that he achieved his greatest success at the stud.

"Baron's Pride" was line bred to "Darnley," his dam being a granddaughter and his sire a grandson of that horse. Foaled in 1890, he was Champion male at the Highland Society's Show as a four-year-old, though his appearance created no special sensation among breeders and judges. He was of medium size and weight, standing just over 17 hands, and being proportionately built throughout, with beautifully laid shoulders and excellent feet and legs. His success at the stud was unprecedented, for during a period of twelve successive years he took first place as a sire of showyard winners. At the Highland Show in 1902, his gets won £252 out of a total prize money offered of £344, thus leaving £92 to be divided among the produce of all the remaining stallions of the breed. Moreover when, in 1911, he dropped back to second place, it was a get of his own which headed the list of winning sires, and a grandson followed in turn. Of his male progeny the greatest as an individual was probably "Everlasting" (11331). Unquestionably the most successful as a sire was "Baron of Buchlyvie" (11263), which sold by auction in 1911 for £9500.

Belonging to quite a different line of breeding, "**Hiawatha**" (10067) was the greatest show horse of recent times. He was got by "Prince Robert," a son of "Prince of Wales," and was bred in the female line from an old Galloway strain. Standing 17·1 hands high, and with well-nigh perfect legs and action, he was, as a mature horse, invincible in the showyard. He was almost contemporary with "Baron's Pride" (1892-1915), and for many years stood second to that horse in the list of winning sires. His stock, however, were more irregular in quality.

Among the older horses now living, the greatest as a sire is "**Dunure Footprint**" (15203), a get of "Baron of Buchlyvie" foaled in 1908. Of full cart-horse scale, he has abundant quality and a magnificent constitution, as can be judged from the fact that in 1917 there were 120 foals registered as his progeny. So completely has the "Baron's Pride" blood permeated the whole breed that it is becoming increasingly difficult to secure "out-crosses" to other strains, and breeders are often faced with the alternative of somewhat close breeding, or of mating mares with horses of an inferior type. (*See* Frontispiece.)

Service fees for good Clydesdale stallions now run high, and it is comparatively common for horses to earn £1000 in a season. The majority are hired by horse-breeding societies at fees which range from £4 or £5 up to £20 or £30, with or without a lump sum as premium. Generally the fee is divided, part payable at the time of service and the remainder if and when the mare proves in foal. A large number of hirings are negotiated at Glasgow Stallion Show, held annually in March, and it has become the custom to make engagements one or two years ahead.

The *Clydesdale Stud Book*, started in 1877, is the official register of the breed. It is an "open" book, *i.e.*, animals are eligible for registration even although they may not be from registered parents on both sides. The rules lay down that a stallion or mare "foaled in or after 1890 must be got by a registered (numbered) sire out of a registered (numbered) dam, *or* must have a pedigree showing three registered (numbered) crosses—that is to say, the animal's sire, the sire of dam, and the sire of granddam must be registered (numbered)."

Horse-Breeding Act: Results 1921.

Number of Clydesdale stallions refused licences for year 1921, and the diseases on account of which they were refused:—String-halt, 4 (a); Shivering, 1; Wind, 10 (b); Side-bone, 10 (c); Bone Spavin, 2; Cataract, 1; Defective Genital Organs, 4; Defective Conformation, 4—total, 36. (a) 1 also affected with roaring; (b) 1 also affected with side-bone; and (c) 1 also affected with ring-bone.

Number of horses examined . . .	705
Number of licences refused . . .	36
Number of licences granted . . .	669

(5 per cent refused.)

Comparative figures for 1920:—

Number examined . . .	748
Number refused	75
	673

(Percentage of refusals, 10 per cent.)

THE ENGLISH FIGURES.

The figures for heavy horses in England were:—

	Examined.	Refused.	Percentage of Refusals.
Shire	2483	167	6·73
Clydesdale . .	281	15	5·34
Suffolk . . .	252	17	6·74
Percheron . . .	41	3	7·32

Animals of the breed have been largely exported to the colonies and foreign countries, Canada having been of late the principal market. The breed is largely represented there, in the United States, New Zealand, Australia, and Argentina, and to a less extent in several other countries. The average number exported annually, for the decennium before the war was 1090.

Points of the Clydesdale.

The *colour* is usually bay or brown—dark shades preferred—sometimes black, more rarely grey, chestnut, or roan. The last three colours are not in favour. The *height* averages about 16·1 hands in the case of mares and probably 16·3 for males. Stallions, which are of course a selected class, average about or over 17 hands, and exceptional individuals reach 17·2 or 17·3. *The head* should be of medium size; the jaw broad; the nose bones straight or slightly arched—not "dish-faced." The *muzzle* not too refined or tapering; the *nostrils* wide and open. The *eye* bright and dark, full and vigorous, yet mild; the *forehead* wide between the eyes; the *ears* of good length, neither hanging, indicating sluggishness, nor "prick-eared"; the *neck* of good length, massive, and well arched in the male, slightly arched in the female when she is in high condition; the *back* straight and broad and not so long as to make it weak; the *ribs* well sprung, round, or barrel-like, and the back ribs long; the *hind-quarters* not too drooping, broad and long, and well packed, and the *thighs* muscular. The *second thighs* well developed and broad; the *girth* round the heart large; the *body* is then deep and the height of the animal greater than it looks; the *shoulder* closely knit at the top, and oblique, though not so markedly so as in the hunter or harness type; the *arm* or *humerus* should form an obtuse angle with the scapula, in order to permit of the free forward movement of the leg. The position is indicated in Fig. 51. The *fore legs* should be straight, not bending back at the knee—a defect described as "calf-kneed." The *muscle of the forearm* should be long and strong, broad from a side view and well developed; the *knee joints* broad and flat; the *cannon bone* of the fore leg should be short and clean, with plenty of substance, should present a flat side view, and should be thick and slightly rounded in front, tapering to an edge posteriorly, assuming a shape somewhat like a blunt razor; the sinews of the back of the leg, thick, strong, well set back and well defined; the *fetlock joints* clean; the *feathering* or long hair, confined to the back of the leg, long and silky, and neither too abundant nor deficient. Long and silky hair is an indication of good breeding. A fringe round the hoof-head is fashionable as helping to show off the foot and pastern. The *pasterns* should be medium in length and sloping, so as to give the necessary elasticity to counteract the concussion caused by the characteristically quick firm step: if long they are weak, if short and upright they render the animal liable to ring-bone and other forms of exostosis. The *feet* should be large, but not thin or flat, or "down in the soles." *White feet*, though common, are objectionable, being frequently though not invariably softer than the others: they are now so prevalent among the best horses that some authorities go so far as to say that a white foot and sock are essentials in a pure Clydesdale. The *hocks* should be broad and clean. If too straight they are liable to curb and thoroughpin, and are often wanting in strength. Crooked hocks are less objectionable, being generally strong if unsightly. The *legs and feet* must be sound, as tendencies to their diseases are generally hereditary. *All four limbs* should be set on straight, and well under the body. Animals with excessive width between either the fore or hind legs are always awkward movers, and can never exert their strength to full advantage. *The action* is quite peculiar, being very free and active and the step long and measured; the animal walking, when unloaded, four miles an hour. Young horses will sometimes exceed this rate, but for an ordinary work horse it is a good pace. The sole should be almost completely inverted each time the foot is lifted either in trotting or walking; the movement of the limbs free and ample at both knees and hocks, and straight, the hocks being kept close together and pointing inwards. A swinging or twisting movement of the fore legs and a sideways cow-like motion behind are equally objectionable. *The temper* should be mild, though the animal should be possessed of plenty of muscular vigour and courage.

The outstanding merits of the Clydesdale consist mainly in the soundness and wearing qualities of the feet and legs, and in its speed and activity: in these respects it is excelled by no breed of draft horse. Its working life, especially on street work, is remarkably long. Its commonest faults are too great length of back, lightness of back ribs, and a general lack of massiveness in build. The temperament, though very rarely vicious in animals that have been properly handled, is more highly strung than in the Shire or Suffolk, and the breed demands, for its completely successful employment, a relatively high standard of horsemanship.

The following is a short list of prominent Clydesdale breeders and Stallion owners:—George Argo, Petty, Fyvie, Aberdeenshire; J. and R. Cocker, Hill of Petty, Fyvie; Thomas Clark, Pitlandie, Stanley, Perthshire; William Dunlop, Dunure Mains, Ayr; George A. Ferguson, Surradale, Elgin[1]; Robert Graham, Kaimflat, Kelso; James Gray, Birkenwood, Gargunnock, Stirling; John Johnston, Dunmore Home Farm, Larbert; J. Ernest Kerr, Harviestoun Castle, Dollar; James Kilpatrick, Craigie Mains, Kilmarnock; James M'Connell, Borland, Whauphill; M. and J. W. Marshall, Bridgebank, Stranraer; A. B. Matthews, Newton Stewart; W. and J. Meiklem, Begg, Kirkcaldy; H. E. Roberts, Monk Castle, Southwaite, Carlisle; Captain A. M. Montgomery, Nether Hall, Castle Douglas; Robert Park, Brunstane, Portobello; John Pollock, Byres Farm, Pollokshaws; John P. Sleigh, St John's Wells, Fyvie; T. Purdie Somerville, Sandilands, Lanark.

THE SHIRE.

The Shire **is the largest** of the British draft breeds, and indeed can fairly claim to be the heaviest breed of horses in existence. The larger sorts are perhaps better suited for draywork than for agricultural purposes, and in districts where such are bred, the chief ultimate object is the production of heavy draft animals to supply the needs of the big industrial and seaport cities. These naturally work on the land for two or three years, until at the age of about five they are sufficiently matured and hardened for street work. A pair of full-sized Shires in a four-wheeled wagon can handle loads of up to 7 tons on reasonably good roads.

History.—As the late Sir Walter Gilbey has shown in his handsome little volume on *The Old English War Horse or Shire Horse*,[2] the Shire owes its origin in part to a race of heavy horses that existed in Britain at the time of the Roman invasion, in part to the introduction from Flanders and elsewhere on the Continent of a large and heavily built breed. The original work of the Old English horse was to drag a cumbrous war-chariot at a furious pace. Cæsar's account shows that even at that early date the breed was one of considerable merit and was maintained in an efficient state of training; moreover, he proved his appreciation of the breed in a practical way by "carrying many of them to Rome," and for a time they were much in request. At a later period it was necessary to maintain the size and strength of the native horse in order to enable it to carry the heavy plate armour of the mounted knight who, with his own and the horse's armour and harness, "often rode more than twenty-five stones." To the efforts made to attain this object we are indebted for the massive frames and powerful limbs of our present-day Shires. It is, of course, within comparatively recent times that horses have all but superseded oxen in the work of the fields, though they have been employed to some extent for several centuries. The earliest record of the use of the horse in field work is preserved on a piece of the Bayeux tapestry of the time of William the Conqueror, showing the figure of a man driving a horse attached to a harrow. A Welsh law of about the end of the tenth century "forbids the farmer to plough with horses, mares, or cows, but with oxen alone" (Youatt).

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[1] Died 1922.

[2] Vinton & Co., London, 1888.

The name by which the breed was generally called during mediæval times was the "**Great Horse**." It is also spoken of as the "War Horse," and subsequently, during the eighteenth century especially, as the "Old English Black Horse."

Records are extant of various measures taken by the Kings of England to the end of improving the native breed of heavy horses. Henry II. appears to have made some effort in this direction, as it is recorded that he imported several horses from abroad, but nothing is known of their type or origin. King John would seem also to have taken a keen and practical interest in horse-breeding. Gilbey, enlarging on Youatt's statement, says that "During the reign of King John (1199-1216) we have distinct particulars of the importation into England, from the low lands of Flanders, Holland, and the banks of the Elbe, of a hundred stallions of large stature; and it is from the blending, seven hundred years ago, of these animals with the English breed that some strains at least of our heavy draft horses, must be said to date their origin." Youatt mentions also that "one hundred years afterwards, Edward II. purchased thirty Lombardy **war horses** and twelve heavy draft horses. Horses for agricultural purposes were chiefly procured from Flanders." Edward III., probably with the object of preventing the loss to the country of its best horse flesh, prohibited the export of any horses whatsoever. Henry VIII. was the author of many regulations dealing with horse-breeding. He enacted that stallions or mares of less than certain specified heights should not be bred from, and compelled nobles and other wealthy persons to keep stallions of a stipulated size. A further Act of 1535 provided "that all owners or Fermers of parks and enclosed grounds of the extent of one mile in compass, shall keep two Mares, not being spayed, apt and able to bear foals of the altitude or height of thirteen handfuls at least, upon pain of 40s." "A penalty of 40s. is imposed on the Lords, Owners, and Fermers of all parks and grounds enclosed as is above rehearsed, who shall willingly suffer any of the said Mares to be covered or kept with any Stoned Horse under the stature of fourteen handfuls." Again in 1541 it was enacted that "no person shall put on any forest, chase, moor, heath, common, or waste," in any of twenty-two shires named, any stallion of less than 15 hands in height. Moreover, the drivers of the said commons were ordered to kill, at their discretions, any animal not considered fit to bear foals of reasonable stature, "or not able, nor like to grow to be able to do profitable labours." Lastly, King Henry "erected a noble studderie for breeding horses, especially of the greatest sort, and for a time had verie good success with them." Holinshed, the author just quoted, writing in the reign of Queen Elizabeth, further says, "Our horsses (*sic*), moreover, are high, and although not commonlie of such huge greatnesse as in other places of the maine, yet if you respect the easinesse of their pase, it is hard to saie where their like are to be had. Our cart and plough horses (for we use them indifferently) are commonlie so strong that five or six of them (at most) will draw three thousand weight with ease for a long journeie. . . . Such as are kept for burden will carie four hundred weight commonlie without any hurt or hinderance."

The breeding of "Great Horses" appears to have declined seriously during the period of the Civil War, and the Duke of Newcastle,[1] writing about the time of the Restoration, goes so far as to say that the many good breeds of horses previously existing in the country "are now all ruined"; but his view seems to have been unduly despondent. At all events, a writer in the *Sporting Magazine* of 1796 says that "no country can bring a parallel to the strength and size of our horses destined for the draught, as there are instances of single horses that are able to draw a weight of three tons." It is interesting to note that Arthur Young, writing at the same period, mentions only two varieties of cart horses — the large Black Old English Horse, "the produce principally of the **Shire** counties in the heart of England, and the sorrel-coloured Suffolk Punch." Robert Bakewell, "the father of modern stock breeding," was a breeder of draft horses, but it cannot be said that his results with the Shire were comparable in importance to those that he achieved with the Leicester sheep. He imported several mares from Holland, and crossed them with native stallions.

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[1] *The Manner of Feeding, Dressing and Training of Horses for the Great Saddle, and Fitting Them for the Field in Time of War*, 1658; 2nd ed., 1667.

Low, writing in 1845, regards the "Old English Black Horse" as merely a branch of the European black race, which then existed "unmixed in the countries of the Lower Rhine, of the Meuse, and the Scheldt, comprehending the States of Holland and the Kingdom of Belgium." He describes the "modern English Black Horse" as follows:—"His colour is usually a sooty black, with frequently a white lozenge-shaped mark on the forehead; and he has very generally one or more of the feet and part of the legs, and not infrequently the muzzle white." His body is massive, compact, and round; his limbs are stout, his chest enormously broad, and his neck and back are short. His mane is thick and somewhat frizzled, and his legs below the knee and hock are hairy down to the heels. His whole aspect conveys the idea of great physical power, without corresponding action. The main defects of his conformation and temperament are too great bulk of body and want of action and mettle. For a pull with a heavy weight he is admirable, but he steps out short, and is slow in all his motions."

The breed takes its name from the "**Shire**" counties of the heart of England, which form its special home. Gilbey says, it "has for centuries, beyond a doubt, been distributed in numbers through the district between the Humber and the Cam, occupying the rich fen lands of Lincoln and Cambridgeshire, and extending westwards through the counties (Shires) of Huntingdon, Northampton, Leicester, Nottingham, Derby, Warwick, and Stafford on to the Severn." At the present time the breed is distributed generally throughout the whole of the lowland districts of England and Wales, except the most northerly counties and Suffolk. While leading studs are now widely scattered throughout this area, certain special districts are famous for the generally high quality of their stock. Such are the Ashbourne district in Derbyshire, the fens of Lincoln and Cambridge, the Peterborough district, the Fylde of Lancashire, and the Welsh border area round Welshpool.

The **Shire Horse Society**, which publishes the "**Shire Horse Stud Book**," organises and runs the Shire Horse Show, and many other important activities, has done much for the interests of the breed. It was established in 1878 as the "English Cart Horse Society," and took its present name in

1884. Many Shire pedigrees of course trace back to much earlier dates than that of the first publication of the *Stud Book*, the earliest going back nearly to the middle of the eighteenth century, and many to the early years of the nineteenth. The following are some of the more important sires of recent times:—

"**Lincolnshire Lad II.**" (1365) was foaled in 1872, and lived till 1895. He was a grey, standing 17 hands high, rather light of rib, and perhaps lacking in massiveness. He proved an extremely valuable breeder and most good Shires of the present day carry his blood. His greatest son was "**Harold**" (3703), a brown horse foaled in 1881, which during the nineties was by a long way the leading sire in the breed, begetting stock of great size and ample bone. His son "**Markeaton Royal Harold**" during the years 1895-1898 was once Supreme Champion, and twice Reserve Champion of the Shire Horse Show.

An earlier animal, "**William the Conqueror**" (2343), a brown foaled in 1862, was also the progenitor of a great number of valuable Shires. His son "**Prince William**," out of the famous breeding mare "Lockington Beauty," was bought as a two-year-old by Lord Wantage for 1500 guineas, and headed the famous Lockinge Stud for twenty years till his death in 1905. Another son, "Hitchin Conqueror" (4458), and his son again, "Blythwood Conqueror," had a considerable influence on the breed, the latter mainly while in the hands of Sir Walter Gilbey.

During the early years of the present century "Dunsmore Jameson" was the most successful sire. By a grandson of "Lincolnshire Lad II." and out of a granddaughter of the famous "Harold," he was thus line bred to this strain of blood. A still greater influence was exerted somewhat later by "Lockinge Forest King" (18867), foaled in 1899, a great-grandson of "Harold" in the male line, and carrying also the blood of "Prince William." He was an extraordinarily impressive sire, his offspring showing a remarkable similarity of type and being easily recognisable, and his influence on the breed was almost comparable to that of "Baron's Pride" on the Clydesdale. At the Show of the Royal Society at Lincoln in 1907 his progeny took five first prizes, and both male and female Championships. At the present time probably the most successful line is that of "Childwick Champion" (22215), through such of his sons as "Champion's Goalkeeper" (30296) and "Champion's Clansman" (29221). "Goalkeeper" was sold at Lord Rothschild's sale in 1913 for 4100 guineas, a price which easily established a new record for the breed. His buyer, Sir Walpole Greenwell, won the Supreme Championship of the London Shire Horse Show with him in the following year.

The following statement of the **points of the breed** is based on that which appeared in the Historical Preface to Vol. II. of the *English Cart-Horse Stud Book*, written by G. M. Sexton, then Secretary of the Society (1881).

Feet.—No maxim was ever truer than "No foot no horse." Weak convex feet and ossifications of the cartilages (side-bones) or of the pasterns (ring-bones) are evils that heavy horses are prone to, and every effort should be made to eradicate them by care in breeding. The feet should be large, but not thin or weak, the soles concave and the hoofs black. White feet are of course associated with white legs, which are now too fashionable and too prevalent.

The fore legs should stand straight, turning neither inwards nor outwards. Pinned-in elbows make the chest narrow, and prevent the proper expansion of the lungs. Projecting elbows are equally objectionable, causing the feet to turn in (what is called "dishing" action), and leading to brushing. The fore legs to the knee should possess well-developed muscles, projecting considerably at the forearm, which should be moderately long. The knees and fetlocks should be large, the limb from the knee to the fetlock flat; the tendons well developed and thrown well back from the bone, so as to be capable of being distinctly felt with the hand; the pastern moderately long and sloping. Short upright pasterns are particularly to be avoided as retarding free action and leading to unsoundness.

The hind legs should be neither too straight nor too bent. The hocks should be broad and strong, and perfectly free from all puffiness in the seat of bog spavin or thorough-pin; the shank flat with well-developed tendons, and short to the fetlock. The hind pastern is as important as the fore, and should be formed similarly; and immediately below the hock the bone should measure at least an inch more in circumference than that below the knee. The hind toes should stand square with the front ones, turning neither inwards nor outwards, though the latter tendency if not exaggerated is the lesser fault. If the toes turn inwards the hocks turn outwards, a condition that leads to great loss of power in draft. The thigh should be round, full, both inside and out, of muscle, which should be carried well down to the hock.

Head and Neck.—The head should be somewhat long, with a broad forehead—an indication of energy and courage; the ears rather long and thin, and pointing rather forward; the eye bright and fairly prominent; the neck rather short than long, rather thick, and moderately arched.

General Conformation.—The shoulder should be well let down into the chest, with sufficient slope to insure free action of the fore legs, and encased with plenty of muscle. The withers being low, the back will close in nearly level. The girth should be large, the chest both broad and deep; the back short and level, the ribs round and coupled up close to the hips, which should be wide; the loin wide and muscular. Short flat ribs are particularly to be avoided, as indicating an irritable temper and a lack of endurance in work. The quarters should be long, wide, and powerful, deep and not too drooping.

Size.—Although a class is provided at the Shire Horse Show for mares under 16 hands, the preferable height is above this. The mare should be long and low of leg. She should measure from the shoulder point to the full extent of the thigh longer than she is high—long in her sides but short in her back—and she should be as deep from withers to elbow as from elbow to ground. An animal so made is bigger than she appears, which is a point in her favour. The stallion should measure 17 hands or over, and his points of excellence are similar. But his form should be more massive and even more compact, his whole appearance masculine, robust, and suggesting the possession of great power, with rather a coarse than an effeminate look about him.

Colour.—"A good horse cannot be a bad colour." Brown and bay are now commonest, with black next in order of frequency. Grey has become much less common within living memory. Chestnut and roan occur, but are not regarded with favour. Much white is objectionable and many foreign buyers will not take animals with white legs, the white skin being, in hot countries, liable to sun scald. *Feather.*—Both fore and hind legs, from the knees and hocks down should carry an abundance of long, straight silky hair. *The action* should be free, the stride long and the legs moved straight. A cart horse cannot be a really good one without the cardinal points of good feet and legs, good walking action, and a robust constitution. "Size, soundness, and substance," a motto from Forshaw's Stud-card, is another summing up of the requirements.

At the time of the formation of the Breed Society, the Shire showed a considerable variation in type from one district to another. Since then marked and steady progress has been made in the direction of uniformity. Originally very prone to unsoundness, particularly to side-bones, the Shire has made very notable progress in this respect in recent times, largely owing to the strict veterinary inspection of all animals at the Society's Show. The percentage of rejections for unsoundness has now become very low indeed.

The differences between the modern Shire and Clydesdale may be briefly summarised. In the Shire the head is heavier, with less proportionate breadth, the eye smaller and the appearance more sluggish; the neck is shorter, set on lower and less crested. The shoulder is heavier and less oblique, the back shorter, straighter, and broader, and the loin more closely coupled; the quarters wider, but shorter and more drooping. The chest is wider and the middle larger, the arms and thighs bigger and proportionately longer, the cannon-bone larger but not so flat or clean, indicating perhaps more tendency to grease.[1] The cannon-bone is also relatively shorter. The pasterns are shorter and the feet more upright. Long sloping pasterns are not appreciated as they are in the Clydesdale, Shire authorities arguing that "long pasterns are a greater evil than short ones." The action is less free, and the legs are placed wider apart, both in front and behind. The hock is flexed to a much less extent in moving. In general, much more emphasis is placed on weight and massiveness, and less on action and wearing qualities, than in the Clydesdale. The Shire is by much the more rapid grower, and reaches maturity earlier than the Clydesdale. This is in part due to differences in management, Shire breeders generally feeding their young horses far more heavily than is general among Clydesdale men; but it is doubtless also a natural characteristic of the breed. Conversely, the working life is shorter than in the Clydesdale. The feather is far more abundant in the Shire.

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[1] Grease in horses, says a champion of the Shire, is a matter of management, and all heavy horses are subject to it, if neglected.

The Shire breed has been largely exported in the past, but in recent times the export trade has diminished. The view held by foreign buyers, particularly Americans, is that this breed is too coarse and too slow for their requirements. Another and probably the greater objection is taken to the feather, which is not regarded as an adornment, but is held to detract seriously from the usefulness of the animals when working on the land or on muddy roads. (See Appendix W.)

The following is a select list of **Shire Studs**:—

His Majesty the King, Sandringham; Edgar I. Appleby, Thurlston Grange, Rugby; Ashby Folville Shire Stud, Ashby Folville, Melton Mowbray; J. M. Belcher, Tibberton Manor, Newport, Salop; A. H. Clark & Son, Moulton Eaugate, Spalding; W. J. Cumber, Theale, Berks; Duke of Devonshire, Chatsworth House, Chesterfield; David Davies, M.P., Plas Dinan, Llandinam; Thomas Ewart, Dunsmore Home Farm, Rugby; F. Farnsworth & Sons, Home Farm, Rolleston, Burton-on-Trent; G. R. C. Foster, Anstey Hall, Trumpington, Cambridge; W. C. & A. J. Flowers, Beachendon, Aylesbury; James Forshaw & Sons, Carlton-on-Trent, Newark; Thomas Fowler, Stud Farm, Tring, Herts; Sir Bernard Greenwell, Bart., Marden Park, Woldingham, Surrey; F. W. Griffin, Boro Fen, Peterborough; C. T. Hoare, Bignell Park, Chesterton, Bicester; Fred W. Ibbotson, Blue Barn Langwith, Mansfield; J. C. Jackson, The Grange, Askern, Doncaster; H. R. King, Poles, Ware, Herts; Lord Middleton, Birdsall, York; Sir Arthur Nicholson, Highfield Hall, Leek, Staffs; Sir E. E. Pearson, Brickendonbury, Hertford; John Q. Rowett, Ely Place, Frant, Sussex; Mrs Stanton, Snelston Hall, Ashbourne; Duke of Westminster, Eaton Hall, Chester; Owen Williams, Crossways, Cowbridge, Glam.

THE SUFFOLK HORSE.

The Suffolk is named from its native county, to which, along with the adjacent portions of Norfolk and Essex, its distribution was mainly restricted until quite recent times. From its thick-set body, short legs, and compact rounded form, it is very generally known as the Suffolk Punch. Its colour is chestnut, and the legs are almost or quite free from long hair.

History.—A Norman origin has been claimed for the breed, but definite evidence is lacking. It is undoubtedly old. **Arthur Young**, writing in the end of the eighteenth century, mentions the Suffolk Punch as one of the two varieties of cart horses in England, and regards it as having been established and even materially improved long before that date. **Youatt** wrote:—

"Horses for slower draught, and sometimes even for the carriage, are produced from the Suffolk Punch, so called from his round punchy make and descended from the Norman stallion and the Suffolk cart mare. The true Suffolk, like the Cleveland, is now nearly extinct. It stood from 15, to 16 hands high, of a sorrel (chestnut) colour; was large headed, low shouldered, and thick on the top; deep round the chest, long backed, high in the croup, large and strong in the quarters, full in the flanks, round in the legs, and short in the pasterns. The Suffolk would tug at a dead pull until he dropped. He was the very horse to throw his weight into a collar, with sufficient activity to do it efficiently, and hardihood to stand a long day's work. The present breed possesses many of the peculiarities and good qualities of its ancestors; it is a taller horse, higher and finer in the shoulders; and is a cross with the Yorkshire, half or three-fourths bred."

The "Suffolk Stud Book" disagrees with Youatt's idea of the origin of the blood introduced to refine the ungainly form of the original Suffolk breed, and shows very conclusively that whatever other crosses had been made, there were two importations of horses from Lincolnshire and one admixture of thoroughbred blood. In 1764, **Andrew Blake**, a well-known breeder of Suffolk horses and owner of stallions, introduced "Farmer" (174) and advertised him as a Lincolnshire trotting stallion. He was a marked success as a breeder, and his progeny realised good prices. By the third or fourth cross they were in turn advertised as pure Suffolks.

In 1801 and 1802, Wright's "Attleborough Farmer's Glory" (1396), believed to be a half-bred Suffolk imported from Lincolnshire, travelled in Suffolk, and "in the first decade of last century there were a good many of the sons of Wright's horse in Suffolk." He was advertised as a "beautiful chestnut cart horse," and "had a little white, and his legs were a little hairy." The horses of the present day are descended from a horse (404) of Crisp of Ufford, the horse of which the earliest individual records exist, foaled in 1768, a year after Blake's "Farmer" was first advertised.

A Historical Notice of the breed, issued by the Society in 1902, says:—

"A curious feature in connection with the Suffolk, is the fact that every animal of the breed now in existence traces its descent in the direct male line in one unbroken chain to Crisp's horse. The form, as described in the advertisements of the time" [15½ hands high; light chestnut, and active; Crisp's noted horse; fit to breed good stock for coach or road], "tallies with the specimens of the present day, with just that modification of form which judicious introduction of more elegant elements would be likely to effect. A detailed description of a descendant of this horse, foaled in the latter end of the eighteenth century, taken from the lips of an old man who remembered him, varied little from the general character of the horse we now have with us."

Barber's "Proctor" (58) (which was intended for a riding horse till an accident in nicking his tail necessitated his being docked), the sire of at least half a dozen horses which travelled in Norfolk at the beginning of last century, was the son of Winter's "Stormer," a trotting horse of great substance. The latter was a son of Gooch's blood-horse, brother to "Thunderbolt." The dam of Barber's "Proctor" was a chestnut. This was the foundation of the "Shadingfield" stock, a light-hearted, high-spirited lot and somewhat short-tempered, chiefly dark chestnuts with white legs, though many of the first generations, and a few of the later, were bays. They were thin in the shoulders, and light of bone below the hock; hard fleshed, wiry, active horses, with long lean heads.

The "Sampson" tribe, most probably an offshoot from the "Farmer's Glory" stock, formed, with the four great branches of the Suffolk breed already mentioned, the five chief tribes from which the modern Suffolk horse is descended. At the time the *Stud Book History* was written, 1880, the "Blake" stock was out of favour as sires and was dying out, but the blood still remains on the female side.

The *Stud Book* notice of 1902, already mentioned, says:—"All extraneous introductions have long since died out in the male line, and those remarkable features—the short legs, the rounded carcase, the longevity with vitality, are still the well-known characteristics of the Suffolk horse."

The essential requisites of a first-class Suffolk, condensed from the "**Suffolk Stud Book and History of the Breed**," published in 1880—the most exhaustive and complete record of its kind in the United Kingdom—are as follow:—

"The recognised *colour is chestnut*, of which there are seven shades—the dark (at times approaching a brown-black, mahogany, or liver colour), the dull dark, the light mealy, the red, the golden, the lemon, and the bright chestnut. The last is the most popular, being a lively shade, with a slight gradation of light colour at the flanks and the extremities, and not infrequently shot with white or silver hairs hereditarily distinctive of some strains, and mostly associated with a star on the forehead, or a thin 'reach,' 'blaze,' or 'shine' down the face. The flaxen mane and tail prevalent about the middle of the eighteenth century, although rare, are usually seen on the bright chestnut. The red, which is almost certain to be a whole colour (also on mane and tail) without variation in shade, is also very popular. The light variety—the cherry red—is said to come of a taint of bay origin. The golden—a beautiful colour, akin to the bright chestnut—is not infrequently associated with a white hind heel. The lemon or 'yellow' is a very light golden shade. The light mealy chestnut is universally condemned as indicative of a weak constitution, soft legs, and a slow phlegmatic temperament. The body is dull, the flanks and underline a mottled ash colour, gradually shading off to a dirty white at the extremities, which are usually covered with soft hair of the same hue. The dark chestnut prevalent in the nineteenth century is in favour with some breeders; but it is mostly a changing colour, varying with the season from almost black to a dark cherry-red, and, although a hardy colour, is not in favour—the dull, dark variety being almost as unpopular as the mealy chestnut. Bay, which is rarely seen, occurs in strains which have a stain in the pedigree. Sorrel was the old name for chestnut. Black, white, grey, and dun are never mentioned among Suffolk horse colours.

"**Quality**, indicated by a thin skin and soft hair tightly fitted, especially over the bones and joints of the legs, has long been a conspicuous feature of the breed.

"**Form.**—The head of the Suffolk has varied considerably in type. Perhaps the big, bold head, long and thin, is the best, but many of the most famous ancestors of the breed inclined to the 'foreign' or Flemish type, showing a short wide head, thick at the chop, the eyes small and slanting downwards, and the ears short, set on low and back towards the neck so as to be barely seen. The neck is strong, rather short and muscular (indicating constitution), deep in the collar, with a fine silky mane on an arched crest, and tapers gracefully towards the setting on of the head. A straight 'ewe neck' is rare and very defective. The excessively muscular development in certain strains of blood is usually associated with a hollow back. The shoulder is muscular, well thrown back at the top, giving the modern comely appearance and smart step to the best horses. A well-rounded rib, deep all the way from shoulder to flank, is a *sine qua non* with a Suffolk horse, and so is a graceful outline of back, loin, and hind-quarters. The hind-quarters are wide and heavy. The rump may be round, almost circular, from the top of the croup to the tail, down to the back of the quarter, by the stifle-bone, and up to the hips. The tail is thin, usually set on low, but the high hip, drooping rump and angular quarter are never found in a true bred Suffolk, nor the square rump with the tail on the top.

"The height averages 16¼ hands, but varies up to 17 and below 16 hands. The girth behind the shoulders is about 8 feet. One Royal winner taped 8 ft. 2 in., and Garrett's 'Cupbearer III.' gave ½ in. more.

"The legs are straight, with fair sloping pasterns, big knees, and long clean hocks on short cannon-bones free from coarse hair. Elbows that are turned in are regarded as a serious defect. The bone of the Suffolk horse is at times objected to by foreign buyers as too fine, but it is after the texture of the thoroughbred, and does not require to be heavy to the eye—a girth of 10½ in. below the knee being considered ample. One Royal prize winner measured 11¼ in., and had no more hairs than a thoroughbred.

"The feet are particularly sound, having plenty of size with good circular form protecting the foot, hard, and well formed, as a result of the stringent regulations against unsoundness introduced by the Royal Agricultural Society of England and the Suffolk Agricultural Association during the third quarter of last century. Early in that period the Suffolk horse suffered, like other heavy horses, from side-bones and various other diseases and defects of the foot, but by stringently eliminating such animals from breeding, the tendency to disease was almost obliterated.

"**General Characteristics.**—For power of endurance, constitution, and longevity, the Suffolk horse has long been famous. Arthur Young records the case of Wright of Rockford Hall, who, with seventeen horses at work, in ten years never changed or added one to these teams, except a stallion. Stallions have been known to travel sixteen and twenty-one years and one even twenty-five years in succession, while a mare has been known to breed till she was thirty-seven years old In temper they are docile, and they can work exceptionally long hours without food. Continental armies use them for artillery purposes. Some of the cleverest cobs in existence are bred out of light active mares of the Suffolk breed. Many excellent hunters in the field, and still more in the showyard, have been the produce of pure Suffolk mares and a thoroughbred stallion. The Suffolk horse is exported to Canada and the United States ; to South America and Australia ; to Spain, France, Austria, Germany, Sweden, and Russia. The breed is to be best seen at the shows of the Suffolk Agricultural Association. Comparatively a limited number have recently appeared at the Royal Agricultural Society's annual show. For all purposes of British agriculture, the Suffolk horse, smart between the shafts in harness, quick at the ends on the plough, a fast walker in the harrows after the drill, and a staunch slave at the collar, be it flour, timber, or chalk behind him, is unsurpassed by any breed of horses. During the first twenty-three years of the Royal Agricultural Society's existence, while the prize was offered for the best horse for agricultural purposes of any breed, fourteen went to Suffolk horses, and the remaining nine to all other breeds."

The modern Suffolk has a body that looks heavy for the limbs, which are clean and fine, with little long hair. He is a long-stepping, active walker, but he does not lift so high in trotting as a Clydesdale or one of the better types of Shire horses, and he seems to twist his legs more when moving. "But from the time he is two years old till he is twenty-four, on every soil, at any farm work, he can hold his own against all comers. In shunting railway trucks, at the heaviest work in the Liverpool Docks, he may be out of place; but for the London delivery van, the miller's flour wagon, or anything requiring power and a quick start, the breeder of Suffolks has little to fear from competition. The Great Eastern Railway Company drove a pair of pure Suffolks for eight years in one of their parcel vans in Ipswich."

G. M. Sexton, on cart horses, says :—

> "The Suffolk is suited admirably to the light land district, where he is bred to perfection, and has no superior for the work he is able to perform. He is endowed with a marvellous constitution, which enables him to do an eight hours' journey at plough and return to his stable looking little the worse for it. He is remarkable, too, for carrying his years well, frequently living and working for upwards of twenty years on the same farm, and at fifteen or sixteen years he looks in the prime of life."

Principal Breeders of "The Suffolk Horse."

Major J. A. Berners, Woolverstone Park, Ipswich; Capt. L. Edmunds, Cholderton, Salisbury; R. Eaton White, Boulga Hall, Woodbridge, Wickham Market; A. T. Pratt, Morston Hall, Trimley; E. H. Preston, Wood Farm, Worlingworth, Framlingham; The Rt. Hon. E. G. Pretyman, M.P., Orwell Park, Nacton, Ipswich; Sir Cuthbert Quilter, Bart., Methersgate Hall, Woodbridge; A. Carlyle Smith, Sutton Hall, Woodbridge; The Rt. Hon. The Earl of Stradbroke, Henham Hall, Wangford; The Executors, Lord Manton, Sudbourne Hall, Orford, Suffolk; W. Woodgate, Framlingham.

The London Cart Horse Parade Society, under the patronage of H.M. the King, held in Regent's Park on Whit-Monday, 16th May 1921, its thirty-first parade, with the objects of improving the "general condition and treatment of cart horses" within the metropolitan postal area; encouraging the humane treatment of the animals, and the use of powerful horses suitable for street work. The number of horses entered was 744, compared with 633 in 1920, and 916 in 1914, and the sum awarded to 597 drivers was nearly £500. In the previous thirty Parades nearly 19,800 horses had been examined by the judges, and cash premiums amounting to £8400, in addition to silver medals, diplomas, etc., had been awarded to deserving drivers. The awards include prizes for good conduct and long service (twenty-five years), a handsome diploma on brass, suitable for fixing to harness, to drivers commended by the judges. The Shire and Suffolk Horse Societies award numerous premiums and silver medals for horses of the best type irrespective of breed.—*Secretary*, 12 Hanover Square, London, W. 1.

THE PERCHERON HORSE.

The Percheron derives its name from the ancient district of **La Perche** in South-Eastern Normandy, comprising parts of the modern departments of Orne, Eure-et-Loir, Eure, and Sarthe. The heart of this district, which has long been famed for the high quality of its horses, is the neighbourhood of the towns of Nogent-le-Rotrou and Mortagne.

The origin of the breed is obscure. The early horse of the district seems to have been a stoutly built animal, belonging probably to the same general stock as the Old English Great Horse and the heavy breed of Flanders. Foreign blood, and particularly Eastern blood, has, however, been freely used for blending with the native stock, with the result that the present breed has come to differ markedly from the other branches of the old heavy type. The first introduction of Eastern horses occurred at the time of the Saracen invasion. In 632, when the invaders were decisively defeated at Tours, a great number of chargers, mainly Arab and Barb stallions of exceptional value, fell as spoil to the French, and it seems probable that these were extensively used for crossing with the native horses. Later, during the period of the Crusades, many more Eastern horses were imported into the country. Much later still, during the late eighteenth and early nineteenth centuries, horses were introduced from Belgium and Denmark, and English thoroughbred sires were also used in La Perche. A more important influence was exerted about 1820 by two grey Arab stallions, "Godolphin" and "Gallipoli," from the Government stud at Le Pin. This stud, established in 1714, on the borders of La Perche, destroyed during the Revolution, and re-established by Napoleon in 1806, has done important services in the improvement of the Percheron. The wide use of these stallions left a marked and permanent impression on the breed, imparting endurance and quality, and probably determining the predominating grey colour. Much of this influence was exerted through the grey "Jean le Blanc" (739), a grandson of "Gallipoli," and foaled in 1823. The type of horse existing in La Perche about and just after this time seems to have met with very wide favour, for great numbers of breeding animals were purchased for other districts of

France, and also for Germany. Its popularity seems to have come perilously near to proving the breed's undoing, for, towards the end of the thirties of last century, the district had been very seriously depleted of its best breeding stock. Farmers were forced to restock by introducing, from Brittany, Picardy, and elsewhere, mares and stallions of inferior bone and substance, and the result was a serious deterioration in the average merit of the breed. Ultimately, however, the old standard was reattained and subsequent generations of breeders have been careful to avoid repetition of the mistake of overselling.

The early type of Percheron can probably be best described as that of a medium-sized, strong, and fast harness horse, eminently suited to stage-coach and other road work, and quite well adapted for agricultural purposes on the moderately light and somewhat hilly land of its home district. **Richardson**, an English writer who knew the breed, thus **described it in 1877.**

> "The best horses . . . run from 15 to 16 hands in height; the head is handsome, though perhaps sometimes heavy, but more frequently as fine as an Arab's; the nostrils wide; the eyes large and expressive; the forehead broad; ears silky; neck rather short, but with a good crest; withers high; shoulders long and sloping; chest rather flat, but broad and deep; body well ribbed; loins rather long; crupper level and muscular; the buttocks often high, leaving a depression above the junction of the tail, which is set on high. Joints short and strong; the tendons often weak; legs clean and free from coarse hair; feet always good, though rather flat when reared on moist pastures; the skin fine, the mane silky and abundant; the colour is generally grey, but there are some fine black Percherons. . . . Docile, patient, honest workers, the Percherons are unexcitable but active and cheerful, rarely showing bad temper, and very free from natural blemish; trotting away cheerfully with heavy loads. The French call them the best draft horses in the world."

With the development of railways in France during the middle part of last century the demand for horses of the heavy coach type declined, and Percheron breeders were forced to seek a modified type. They began to aim at increased size and weight, and have succeeded in evolving an excellent draft breed. At one time, indeed, there was a tendency to go too fast in this direction, and breeders were led to sacrifice many of the best of the lighter type of mares and to retain others which had little except their weight to recommend them. The result was a loss of quality and action. But recently sounder views have prevailed, and the modern aim is a combination of moderate size with the old qualities of activity and durability. Government assistance has been of considerable importance in the improvement of the breed. This has taken the form of maintaining the stud at Le Pin, already mentioned, and of subsidising all privately owned stallions of outstanding merit.

Since 1885 no stallion has been permitted to be used for public service unless it has been passed and graded by Government inspectors. Stallions are graded as (*a*) subsidised, (*b*) authorised, and (*c*) approved. The first grade are awarded bonuses of 300 to 500 francs annually; the second receive certificates of recommendation, while the third class, few in number, are granted a bare licence.

The French Percheron Society (Société Hippique Percheronne), with headquarters at Nogent-le-Rotrou, was founded in 1883. It watches over the interests of the breed, publishes a *Stud Book*, and holds an official show annually at Mortagne, Nogent-le-Rotrou, or La Ferté.

Points of the Breed.—*The colour* is very generally grey, varying from a very dark iron shade to nearly white. Black is next in order of frequency and is quite popular. Bay and brown are rare, but are recognised colours. Chestnut does not occur. *The height* averages perhaps 16·1 or 16·2 hands for stallions, and rarely exceeds 17. Mares run from 15·2 to 16·2, great height being not particularly desired. *The weight* is great in proportion to the height, owing to the generally compact and blocky conformation, but even in this respect the breed is smaller than either the Shire or Clydesdale, though a few animals in show condition have exceeded a ton in weight, which is exceptional for any breed. *The head* is characteristically lean, the forehead broad, the eye large and prominent, the face straight or slightly dished above the nose; the jaw is very strong and the ears small and well carried. The neck is of medium length and highly crested; the mane abundant. The shoulder is well sloped back, the chest wide and full, and the back short and broad. The ribs are exceptionally well sprung, roundness of barrel being a very regular breed character, but the depth of back-rib is sometimes less than could be desired. The rump is commonly rather short and steep, even in the best specimens, and the tail set on too low. The quarters are wide and heavily muscled, and the arms and thighs show good muscular development. British judges are frequently inclined to "fault" the hocks, which are often too full, lacking in breadth, and with too much "set," *i.e.*, too crooked. The bone is clean and hard, if frequently rather round, and the legs are free from long hair. The pasterns are short and strong, the hind pasterns often with insufficient slope. The feet are sufficiently large, shapely and durable, and generally excellent. The action is characteristically sharp and free; and good specimens trot with great resolution and vigour, the knee action being high and the head carried well. The step is probably shorter and the front action less straight than in the Clydesdale, yet the breed compares favourably with most others in respect of movement. The temperament is willing and docile. It is well known that many stallions are worked in France.

In the United States of America the Percheron is the most popular of the draft breeds, being considerably more numerous than all others together. It is widely represented in the Argentine and many other countries. It appears to owe its widespread success to its clean legs and sound feet, its mild and willing temperament, and its strength and endurance, particularly in moderately fast work. Importations of pure-bred stock into Britain, on any important scale, began in 1918. Since then several consignments have been introduced both from France and North America, and the breed has made considerable progress in public favour.

CHAPTER XXII

HORSES (LIGHT)—THOROUGHBRED, ARAB, HACKNEY, CLEVELAND BAY, YORKSHIRE COACH-HORSE, AMERICAN TROTTER

The Thoroughbred—Race-course and other Selection—Early Improvement—Importation of Roman, Spanish, Arabian, and other Horses—Failure of Early Crosses—Ridgway and Blunt on the origin of Light Horses—**The Arab Horse**—Names—Strains—Colour—Points—The Royal Commission on Horse Breeding—The Hunter's Improvement Society—The Brood Mare Society—The Harness Horse and Pony Society—Army Remounts—**The Hackney**—Origin and Development—The Modern Norfolk Trotter—Yorkshire Trotters—The Exportation of Hackneys—**The Cleveland Bay**—**The Yorkshire Coach-Horse**—The Rule of the Road—"The Horse's Prayer"—**The American Trotting Horse.**

THE THOROUGHBRED[1]

IS in some respects perhaps the most interesting of our British live stock. It has been bred without admixture of alien blood for over 150 years, and during that time it has been subjected to the most rigorous system of selection through individual trials of strength and endurance. No breed has been so effectually tested for the special qualities required of it as the Thoroughbred. The showyard test of the cart horse is very different from this test; the merits in a show competition being determined by external appearance and by inference, not by trial in the work for which the animals ought to be most prized. The endeavour to judge the qualities of a Thoroughbred by external appearances only ends in failure and disappointment in most instances, even when this is attempted by the most skilful. An additional selection over and above the process of natural selection is apparently necessary, when we realise that between 1877 and 1893 the Derby was won on five occasions by an unsound animal.

Records exist of racing in this country as far back as the beginning of the thirteenth century, but of the early improvement and management of British horses little is known with certainty. After the formation of good roads, the Romans imported horses of lighter build than the native English horses, with the object of improving the latter for road-work. Athelstan introduced running horses from Germany. Spanish horses were next used before Arabians were brought in. What were called the "Royal mares" were imported by Charles II. About the end of the seventeenth and beginning of the eighteenth century the most **famous of the Eastern sires** were introduced, viz., the "Godolphin Arabian," the "Byerly Turk," and the "Darley Arabian." These horses, mated with the blood of the Royal mares and with the best of the native English horses of the time, acquired a very large share in the establishment of the English Thoroughbred. Going still more closely into the origin of the best Thoroughbred horses of the present day, it will be found that all can claim relationship with one or other of the **three famous sires**—"Herod," "Eclipse," and "Matchem," from which all our present-day horses descend in tail male. (See Appendix Q.)

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[1] See *The Horse: How to Breed and Rear Him*, by Wm. Day, of Salisbury (Bentley & Sons, 1888), to which the Author acknowledges indebtedness.

The superior qualities of the few have been taken advantage of in the improvement of the many. The improvement has been great in the special direction and for the special purpose for which the race-horse is kept. "Two distinguishing qualities of the English Thoroughbred are, great speed with a light weight over a short distance, and early maturity." So much has the element of usefulness been sacrificed in recent years in the interests of baby racing, says one high authority, "it is generally estimated that out of every 2000 horses bred, only about three obtain pre-eminence for speed, strength, staying power, and pluck . . . hundreds of horses being permanently ruined by pernicious premature training." It is true that the length of a race, which in olden times extended over three or four miles, has now been much shortened, and horses are trained to do short distances at high speed; but there is little doubt, nevertheless, that the staying power of the breed is as good as ever, while the pace in later years has greatly increased. Greater speed has been associated with a larger stride and increased height. Sir Walter Gilbey records, on the authority of Admiral Rous, who wrote in 1860, that the English race-horse had increased an inch in height in every twenty-five years since 1700,[1] but this is probably an exaggeration.

The first or early crosses with Turkish, Arabian, or Barb horses did not prove a success as regards the production of winners, but the improvement due to the distinct impetus given by the cross became apparent in later crosses in the form of animals superior to either the imported or the English horse of an earlier date. Though this is admitted, it is generally accepted in relation to racing, that no advantage could now be gained by crossing with any alien blood not descended from the English Thoroughbred. Arab horses, for example, are supposed to have remained at much the same stage of advancement for the last two hundred years, while the English Thoroughbred racer has been vastly improved.

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[1] Preface to *The Arab the Horse of the Future*, by Sir James Penn Boucaut (Gay & Bird, London, 1905).

Professor Ridgway's work, referred to on page 432, created a new interest in this subject. The chief objects of the book have been stated to be two. "The *first*, to set out the evidence to show that the generally received notion of the Arab horse being the ultimate source of our Thoroughbreds has no historical foundation; that the Arabs only got their fine breed of horses from North Africa at a period later than the Christian era; that a thousand years before they ever bred a horse there existed a fine breed in Libya, in North Africa, and that from this North African stock, a variety distinct from the clumsy, thick-set, slow horses of Europe and Asia, have sprung all the best horses of the world. The *second*, to trace the important part played in history by this Libyan horse and its descendants."

Much of the evidence advanced in support of Ridgway's contentions was freely criticised by Wilfred Scawen Blunt,[1] who possessed a wide personal acquaintance with Eastern countries and Eastern horses. The Libyan horse Blunt identifies with the Barb, which "may have found its way to the North African shore at a very early date from the neighbouring coasts of Spain, and there, in the special environment of the desert plateaux immediately south of the mountain ranges, have acquired . . . the superficial qualities of thorough breeding, while retaining the convex head, the drooping quarter and low carriage of the tail which belonged to his European progenitors." The Arabian horse, or *Keheilan*, the origin of which Ridgway attributes to the Nile Valley, with its extremely unlikely conditions for developing a breed of horses, Blunt claims for the Euphrates Valley, and more remotely in time and distance for Southern Asia. Whatever may have been its origin, Ridgway has established the existence of a Libyan horse of superior quality, highly specialised by its peculiar environment, which he asserts was bay in colour with a white stain on the forehead; also, that the swiftest horse in Homer's time was of this colour, and that the "dark horses of Libya" were the swiftest in the classical times of Greece as well as "in the Roman circus in the first century of our era." He says further, on the authority of tomb-paintings, that "horses of a bay or brown colour existed in Egypt fifteen hundred years before the Arabs possessed a horse." The drooping tail of "Spearmint," the Derby winner of 1906, and of many of the best modern Thoroughbreds, is, if Blunt be right, additional evidence of their Libyan connection, which Ridgway advances on the plea of colour—there being no dun Thoroughbreds and a greatly preponderating and increasing proportion of bay horses among the best horses which have run in the Derby, the Oaks, and the St Leger from 1870 to 1899. Chestnut comes next to bay as a good second, but blacks and browns are not much in evidence, and grey, which a short time ago was nearly extinct, is now becoming quite plentiful, principally through the "Roi Hérode" channel.

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[1] In *The Nineteenth Century* for January 1906, No. 347.

The conformation of the Thoroughbred is distinctive,[1] and like that of the greyhound, another animal of great speed, built on most beautiful and symmetrical lines, combining extreme quality and grace with strength. While it is only right that every judge should have his own ideal in his mind's eye, it must be remembered that the old adage still holds good that "they run in all shapes."

There is one point, however, which every good individual must possess, and that is CHARACTER.

Character and class in a race-horse are two qualities very difficult to describe, but (with soundness thrown in) they are the pearl of great price, and the possessor of such a horse is indeed lucky.

It is generally conceded that in order to produce great speed, length is required in some part of the conformation. The two types may be briefly summarised as the long and low, as opposed to the short-backed, high in the leg, horse. The St Simon tribe have brought the latter type into great prominence.

The head should be fine, lean, and moderately small, wide between the eyes, and tapering down to a fine muzzle, with a wide space between the jaws; the eye bold, intelligent, and kindly; the nose rather convex or Roman, denoting courage; although there have been many good horses with concave or dished faces.

Ears clean cut, mobile, and carried forward, as opposed to backward, give expression to the face, and are a sure index to character. But many horses descended from the Melbourne branch have lop or drooping ears, which are distinctive of that blood, and quite correct. Most lop-eared horses are very game. The setting of the head on to the neck is important, and rather depends on the neck. The latter should be strong, wide on top, and bloodlike, with a slightly arched crest, as opposed to a ewe neck, which looks as if it were put on upside down, and denotes weakness, and a tendency to carry the head in the air, a sure sign of a non-stayer. The length of neck should be proportionate to the rest of the body. Too short a neck makes it very difficult, especially for a foal, to graze properly without distorting the shoulders and feet. Too long a neck predisposes the animal to wind infirmities.

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[1] By a breeding and racing friend of the Author.

The shoulders are an all-important point, and must be set obliquely. They should extend right back into the horse's back and be surmounted by strong narrow withers. A straight or perpendicular shoulder, loaded with muscle, although excellent in a draft animal, is to be avoided in the horse whose function is saddle work.

The back should be straight and strong, with plenty ot muscle, particularly over the loin. The tail should be set on high as in the Arab, rather than low down, and should be strong, and covered with hair of a fine quality, a conformation which denotes strength and breeding. A big posterior, with wide muscular quarters, not only fills the eye but makes for propelling power.

The ribs should be well sprung and deep, especially in a horse; in the case of a mare a lighter rib is only natural.

A wide chest is apt to denote want of speed. A deep-bodied horse has plenty of heart room without being wide chested, and this is the conformation of a stayer.

Good legs and feet are a very important point in any horse, especially the Thoroughbred, which is called upon to do so much fast work.

The fore leg, looked at from the front, must be in a straight line from the elbow to the ground, and should be so placed that the two legs are closer together at the ground than they are at the chest.

The elbows should be slightly turned out, rather than inwards, which latter conformation is described as "tied," and renders the action cramped.

The knees should be large and, looked at from the side, should be rather "over," or bent forward, than back, which latter conformation is termed "calf-kneed," and is a malformation to be avoided. Viewed from the front they should be large and flat. A good shaped fore leg is long from the elbow to the knee, short from the knee to the fetlock with good bone below the knee, 8 inches and over. When viewed from the side the bone should be flat and thin like a knife-blade from the front. When comparing the measurement of bone of a Thoroughbred with that of a cart horse, it is well to bear in mind that the texture of the bone of the former is almost like ivory.

The forearm should be well muscled up, although many horses that stay well are lightly muscled on the forearm and thigh.

The tendons and suspensory ligaments of the leg should stand out clearly to view below the knee, as opposed to those of a round fleshy fore leg.

The pastern-joint should be oblique like the shoulders. Too oblique a pastern is a sign of weakness, and when seen in a foal shows that the mare is not nursing it well.

The foot should be large and open, of a tough quality, not brittle or contracted, and should point in line with the leg as seen from the front. It should not be turned out or "lady toed" as it is termed, nor turned in, which causes cutting and brushing of the other leg in galloping.

The stifle should be slightly turned out, sufficiently to allow free play for the hind legs when brought forward in galloping. The hocks should be strong and well let down into the leg, with no sign of curb or spavin. The greater the distance from the round bone to the hock, the greater the horse's stride.

Viewed from behind, the hind legs should stand perpendicular, with the hocks rather turned out than in, which latter conformation denotes weakness, and is termed "cow hocked."

A straight or perpendicular hind leg when seen from the side, as opposed to a sickle hock, is by no means a fault in a race-horse, as it denotes good leverage, with a long stride that does not easily tire.

When in the summer of 1917 a clamour was raised by a few ignorant, although some of them well-meaning people, incited by cranks and faddists with ulterior objects in view, to stop racing in this country, under the plea of "saving food for the people," the author addressed letters to the Press in which the following leading facts were made widely known.[1]

It is generally recognised that Great Britain possesses in its Thoroughbred stock a national asset of almost incalculable value. To the superiority of the British horse and the sporting instincts of the British horseman, the Empire owes countless victories not only over its rivals in the field of sport but over its enemies on the field of battle. The Duke of Wellington in the Peninsular War thought it worth while making his men hunt behind the lines to teach them to ride straight and "have an eye for country"; a Scottish subaltern hunted a pack of hounds before the troops in the ride to Pretoria; and in the retreat from Mons, when General Allenby with 12,000 horsemen outmanœuvred and checked 40,000 Germans, our forces were to a great extent horsed with hunters or the get of Thoroughbreds. The English Thoroughbred is the fountain-head of all that stands for quality, beauty, strength, and staying power in light-legged horses, and for much that is of greatest merit in the heavier types where "a cross of blood is worth an inch of bone"

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[1] *The Sporting Life*, 13th June 1917, etc.

—a fact which was proved over and over again in the Great War. It is only a slight exaggeration to say that the American Standard Trotter is 99·99 per cent. a Thoroughbred built by nature in a form to suit his work.

The value of the English Thoroughbred is abundantly recognised abroad. For years before the war all the Great Powers (except Great Britain) were officially represented at the annual sales of blood-stock, by buyers paying long prices for animals of good pedigree and outstanding individual merit. As late as 1913 blood-stock sales at Tattersall's and Newmarket to foreign countries, amounted to not far short of £300,000. Russia, for instance, gave £20,000 for "Kendal," and later the same sum for his son "Galtee More," a Derby winner, to improve her cavalry horses. Nor were Germany and Austria less far-sighted in their military preparations, as the British and their Allies found to their cost; the cavalry of the Central Powers was strong with the strength of the English Thoroughbred.

The dawn of the industry of Thoroughbred horse-breeding is as obscure as the early history of the blood-horse himself. For long the unadulterated stream of blood was the special care of our landed aristocracy: to them we owe the rigid and golden rule that unless a horse or mare traces in tail female back to one of the original mares in the first volume of the *Stud Book*, it is impossible to get it entered into the *Stud Book* of to-day. But in England in recent years, as at an earlier date in Ireland, many small farmers who never backed a horse to win a race, took up the industry and invested in it their hard-earned capital. With the exception of racing, the practices involved in the work are of the most technical kind, and of little interest to any but those employed in it as their means of livelihood or as their hobby; hence the ignorance and indifference displayed by the public and the lack of a general protest when it was proposed for political reasons to stop racing. The British Government has never exercised any useful control over racing, nor bestowed on it more than the most trifling patronage.

The industry, it must be clearly understood, does not exist for the sake of the Turf: the Turf exists for the sake of the industry. And for the industry the Turf is indispensable as the supreme test of performance. Only on the race-course can the inner worth, the intrinsic value of a Thoroughbred be established: and, to give full confidence, the trial must be made in full public view under the exciting circumstances which at the same time stimulate and test the nerves and the temper of the horse. No one would accept a private test even if it could be made; and the value a horse gains by successful competition throughout the period of its development, would never accrue. A horse that, judged by his look and pedigree, would only realise £250, may, like "Rock Sand," fetch £25,000 after he has shown what he can do in a race.

When the industry was struggling against the inevitable effects of the war, the British Government, acting through the War Cabinet, essayed to strike what might have been a fatal blow by forbidding all horse-racing. Valuable stock which should have been retained in this country, was sold to foreign buyers at absurdly low prices, and the value of the export trade in horses shrank by more than half. Colts were castrated in great numbers, and whole studs (such as Musker's 400 head) were sold off; but fortunately the industry has survived and recovered in a marvellous and undreamt of way.

It is to be hoped the British Government and the British people have both learned the lessons of the war, and that they will give active encouragement to a national industry, which not only supplies one of the greatest of British sports, but intimately contributes to the safety of the country and the Empire.

THE ARAB HORSE.

The Arab breed of horses is the pure Thoroughbred of the East and of Africa, as the English Thoroughbred is that of the West. It has been in times past responsible for the *quality* that has appeared among horses of mixed blood in Eastern countries. Whatever may have been the original habitat in which this peculiarly beautiful section of the great family of *Equidæ* became developed and specialised, there is no historical record or reliable evidence that the Arab tribes possessed horses until after the beginning of the Christian era, though it is probable that horses existed in Arabia at an earlier period. Camels were, before horses, the Arab's stand-by. He ate their flesh and drank their milk, and they carried him into battle, but it was not till Arabs became expert horsemen that they attained distinction as warriors. In some Eastern countries, as in Western and Southern Europe, the horse was first used to draw chariots, and never to carry mounted men, probably owing to the smaller size of the early representatives of domesticated horses, but in Arabia it has never been used except for riding.

The name "Kohl" and its derivatives, *Keheilan*[1] horse and *Keheilet* mare, originated in kohl, a powder of antimony used by Eastern women to darken the skin round their eyes. The eyes, especially of grey and white Arabs, show dark peripheral rings; and, correlated with the unfailing darkness of the uncovered skin near the eyes and muzzle, is a blue-black skin beneath the hair of the body and limbs, except under a white snip, a blaze, or stockings of varying dimensions.

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[1] *Keheilan* is also claimed to be a generic term meaning "pure-bred."

The true Arabian horse belongs to one or more of the strains of blood known as Al Khamseh, **The Five**,[1] viz., (1) Keheilan, (2) Seglawi, (3) Abeyan, (4) Hamdani Simri, (5) Hadban. There are some sixteen other less-noted strains, with numerous sub-strains. Contrary to the general opinion held in this country, probably over 85 per cent. of Arab horses are dark in colour. The preponderating colour, as in the English Thoroughbred, is bay, and it is on good authority admitted that, with some conspicuous exceptions in favour of white or grey, the best Arabs are bays, usually with black points, although Major-General W. Tweedie[2] says the true nutmeg-grey runs the bay colour close for the place of excellence in the Arab breed. Chestnut colours of different shades are numerous, and browns are not uncommon. No Arab foal is ever born white, but "always bay, chestnut, or dark brown." Blunt says, "Roans, piebalds, duns, and yellows are not found among the pure-bred Arabs, though the last two are occasionally among Barbs." Ridgway says—"In Syria there are more grey and far fewer bay horses, and occasionally black; in Turkish Arabia grey practically becomes the universal colour, and sooty black is common in the Kurdish horses; whilst the Shammar horses [belonging to tribes in the region between the Euphrates and Tigris, north of Irak in Turkish Arabia] seen by Upton were white, grey, and reddish-grey." This divergence from the normal Arab colour he attributes to crossing with "the Upper Asiatic horse [of the type of the pure Mongolian pony], which forms the substratum of all the horses of Syria, Turkish Arabia, Armenia, and Persia." The cross-bred descendants acquire greater size than either original pure-bred parents—the Turcoman or Persian horse being 15·2 hands, while the best Arabs average about 14·3 hands, though some attain to 15 hands in their native country. In Arabia, where the total number of pure Arabs is not now great, some of the best horses are in the possession of the Anazeh tribes of the deserts of the central plateau, 4000 ft. above sea-level. Blunt specially names the Gomoussa as having "really fine mares." "Arabs trace the pedigree of their horses through the dams, and not through the stallions as with us," which accounts for the difficulty of procuring mares for export.

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[1] Ridgway gives several traditions which unconvincingly attempt to account for the origin of *The Five*, pp. 165-7. See previous footnote, p. 432. All authors do not agree with the same arrangement of families.

[2] *The Arabian Horse; His Country and People*. Published by William Blackwood & Sons, 1894.

Points of the Anazeh Arab Horses.[1]—A very perfect animal of the highest courage, standing about 14·2 hands at the withers. In the general form there is a beautiful balance of power and symmetry, and for racing, to which it has been dedicated, the great general length gives it a long reach or stride. The barrel is round and extra well ribbed. The head is not proportionately small, but beautifully formed. It is large and broad above the eyes (which are full and prominent), short, and tapering from the eyes to the muzzle, with a depression or hollow in the face. The unusually long, wide nostrils, capable of being greatly dilated, open upwards and outwards with accelerated breathing, due to violent exercise. Some tribes of Arabs remove the point of a gristle which supports the lower lip of each nostril, to permit of greater expansion. The ears are not long, but pointed, beautifully shaped, and characteristically placed, thus indicating purity of breed. The light but strong and muscular neck is of moderate length, and forms a graceful arch from the poll to the withers. The withers are high, full developed, and run well back, but they are not too narrow or thin. The back is short, the loins powerful and well coupled, the haunch very fine, the tail set on high, and the dock short. The quarters are long and deep; the gaskins full and muscular without being heavy or unshapely; the thighs well let down; the hocks clean, large, well formed, and well placed. The shoulders are long, powerful, and well developed, but light at the points. The arms are long, lean, and muscular, and deep at the well-developed elbow. The knees are large, square, and deep, and the pisiform bones behind very prominent. The legs are short, deep, and have fair-sized bone, with the tendons and ligaments large and well strung. The feet are wide, and open at the heels, rather deep, and slightly elongated. The fetlock joints are large and bold; the pasterns long, large, sloping, very elastic and strong. The sinuous-like movement corresponds to that of a serpent.

The hardiness of a high-bred Arab is well illustrated by the following **brief history of "Mahmud,"** whose photograph in short summer coat formed the original of Plate CXVII. B, taken when he was about twelve years old.

He was bought in Cairo by Lord Tullibardine for £18, when "rising four," out of a drove of young horses from Damascus, and taken to a racing stable to be trained; "but whenever he found himself collared, he used to turn and savage the horse that was bothering him, so was of no use for racing." This is admitted to be quite an exception to the Arab character. He carried Lord Tullibardine through the Egyptian campaign,

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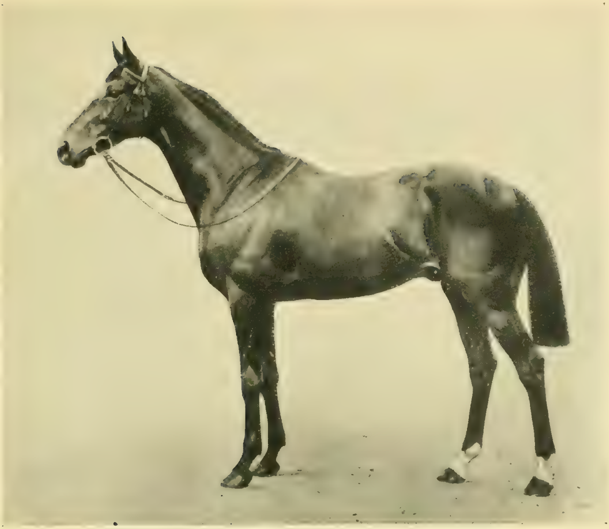
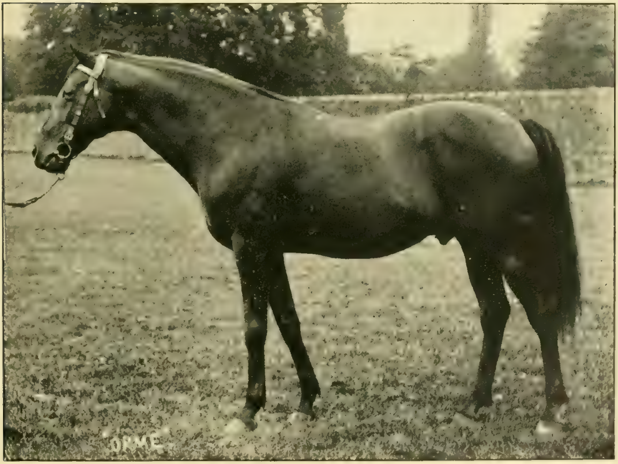
[1] With acknowledgments to Upton.

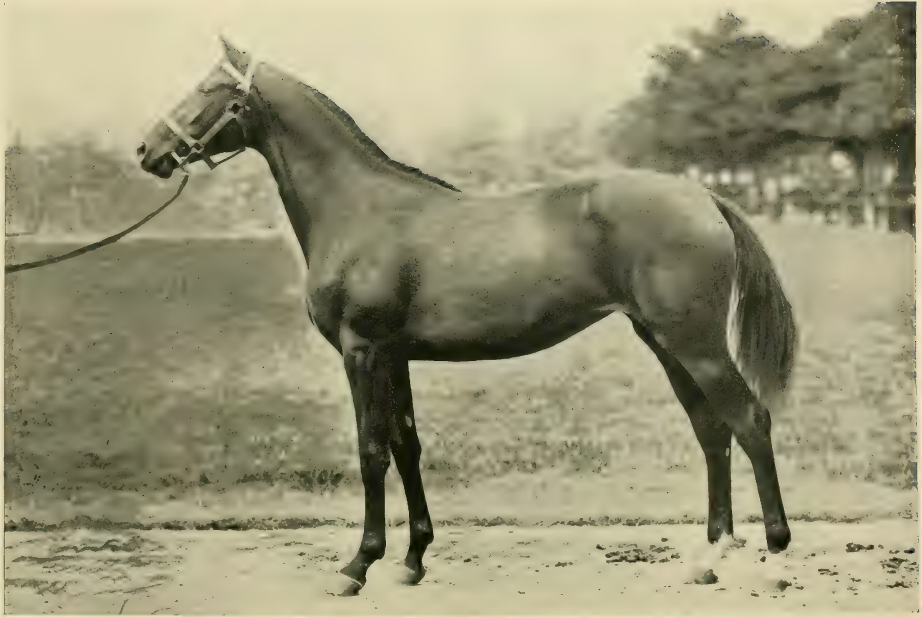


A. "WILLONYX" BY "WILLIAM THE THIRD"—"TRIBONYX."
Winner of the Chester Cup, the Ascot Stakes, the Ascot Gold Cup, the Cesarwitch, and the Jockey Club Cup, 1911.
[*W. W. Rough & Company*, 161 *Strand, London.*

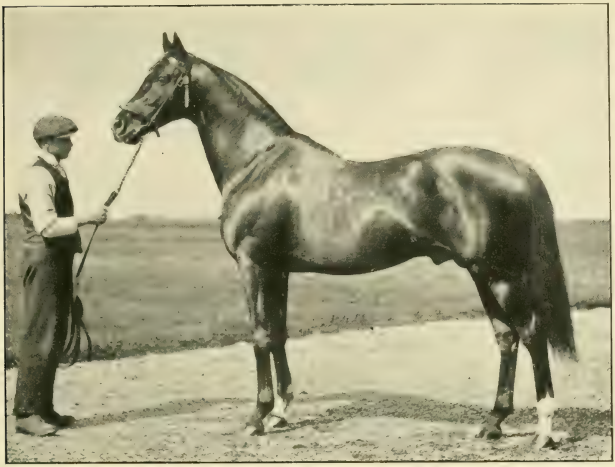


B. THOROUGHBRED SIRE, "ORME."
Winner of over £38,000 in stakes; sire of "Flying Fox."
Owned by His Grace the Duke of Westminster.
[*G. H. Parsons, Alsager, Cheshire.*

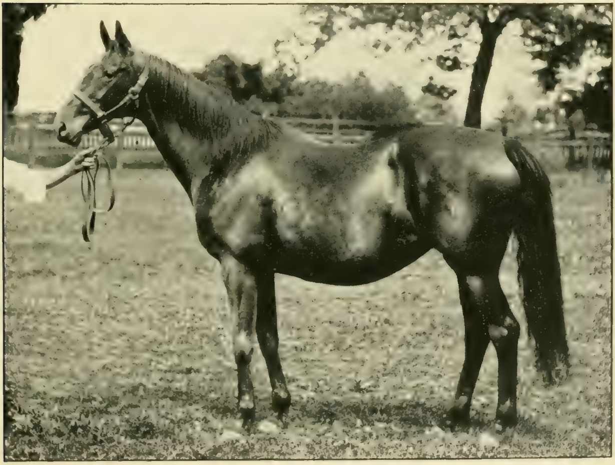
PLATE CXIV.



THOROUGHBRED YEARLING FILLY.
Owned by T. J. Farley, Ardmore, Blackrock, Co. Dublin.
[From "The Journal of the Board of Agriculture and Fisheries for Ireland," Oct. 1904.



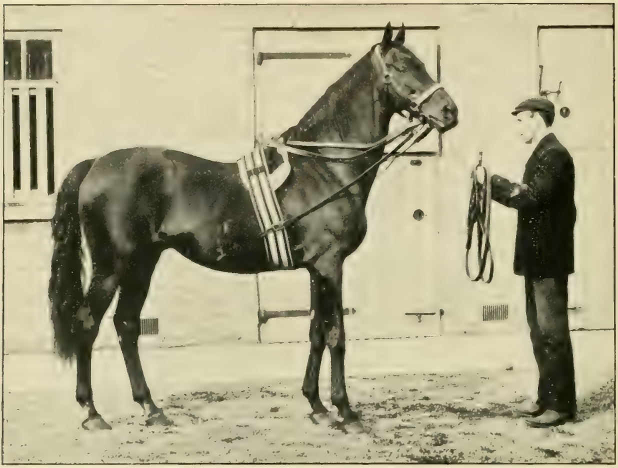
A. "CYLLENE," BY "BONA VISTA"—"ARCADIA."
Sold for £31,500. Thoroughbred stallion; sire of "Cicero," winner of the Derby, 1905.



B. THOROUGHBRED MARE, "ORNAMENT."
Own sister to "Ormonde," and dam of "Sceptre."

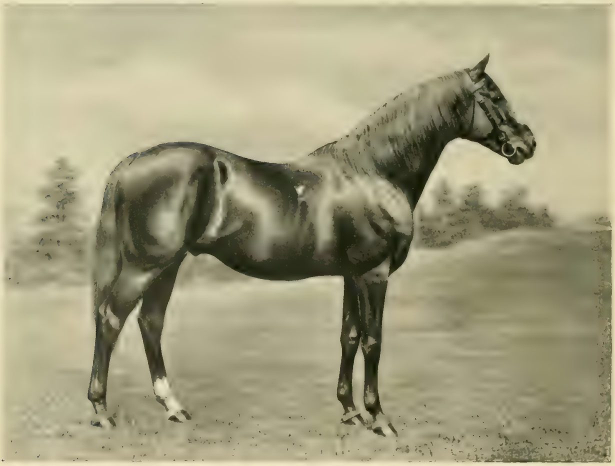
[Both by G. H. Parsons, Alsager, Cheshire.

PLATE CXVI.



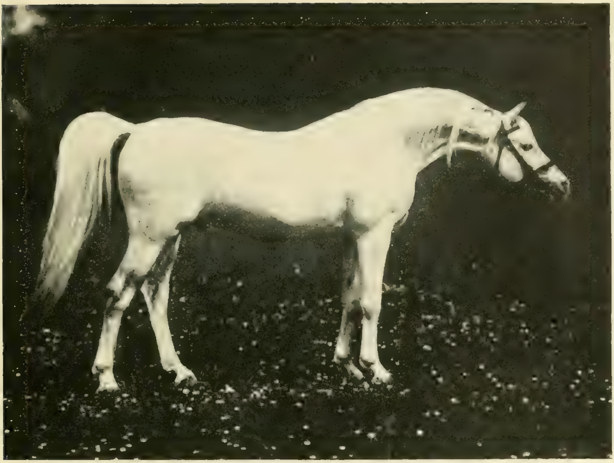
A. Thoroughbred Stallion, "St Simon," at 21 years. Foaled 1883. By "Galopin"—"St Angela." Owned by His Grace the Duke of Portland. Unbeaten on the Turf; the greatest sire of his time; his progeny, including two Derby winners, has won over £506,000 in stakes.

[*G. H. Parsons, Alsager, Cheshire.*

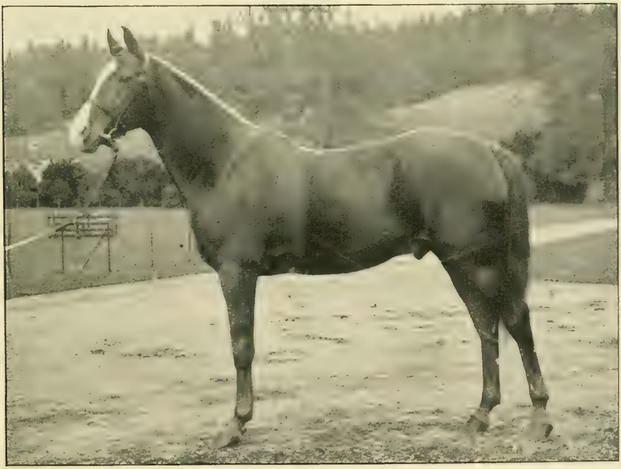


B. Thoroughbred Stallion, "Bend Or," the most handsome of Thoroughbred Horses, and sire of the unbeaten "Ormonde," won the 1880 Derby, and in 1881 the City and Suburban, carrying heavy weights. He died old. Bred and owned by the late Duke of Westminster.

[*Clarence Hailey, Newmarket.*

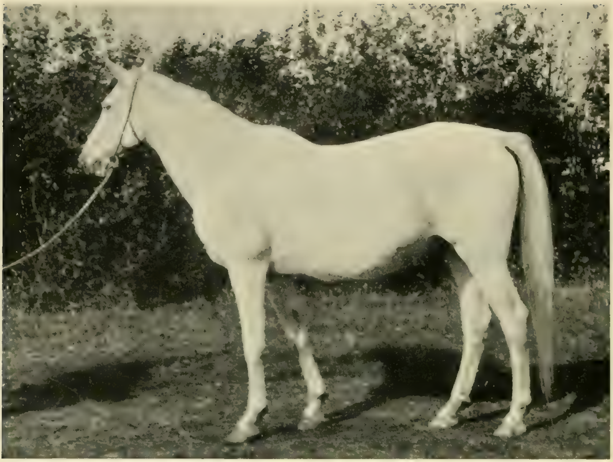


A. Arab Horse (Grey), "Skowronek" (1909). Vol. I., Stud Book.
By "Ibrahim" out of "Yashonika." Bred by Count Potocki, Poland. Imported by the late Walter Wiennans. Sold to H. V. M. Clark. Bought by Lady Wentworth.

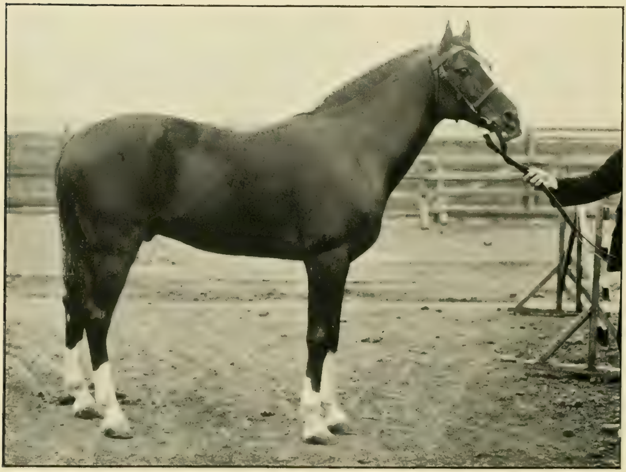


B. Arab Horse, "Mahmud." See p. 480.
Was owned by The Duke of Athole and ridden by him when he was Lord Tullibardine.

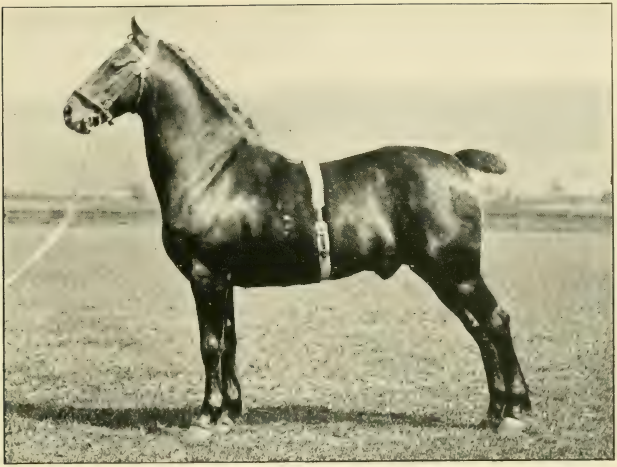
[*A. F. Mackenzie, Birnam, N.B.*



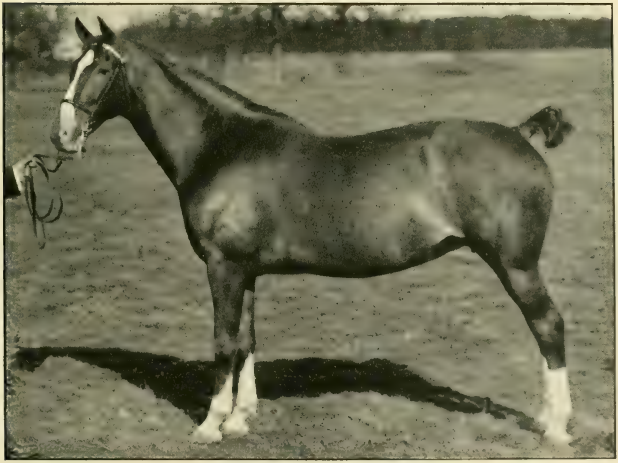
A. Grey Arab Mare, "Ruth Kesia.
A winner of many prizes.



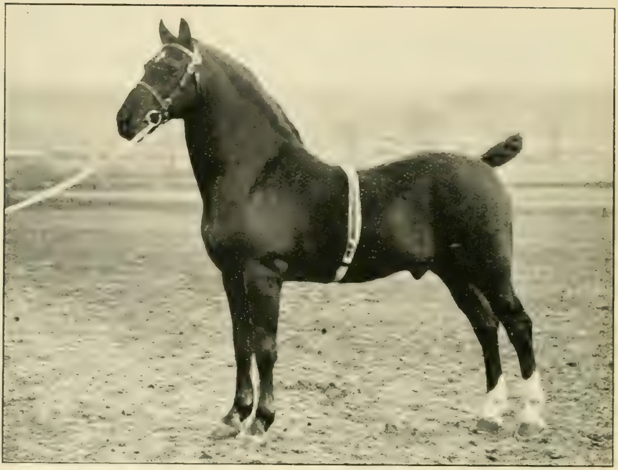
B. High-caste Arab Stallion, "Scorn," 14.1½ h.h.
Winner of many races in India. Taken to N. S. Wales by G. R. Jackson, Temdale, Mohouga.



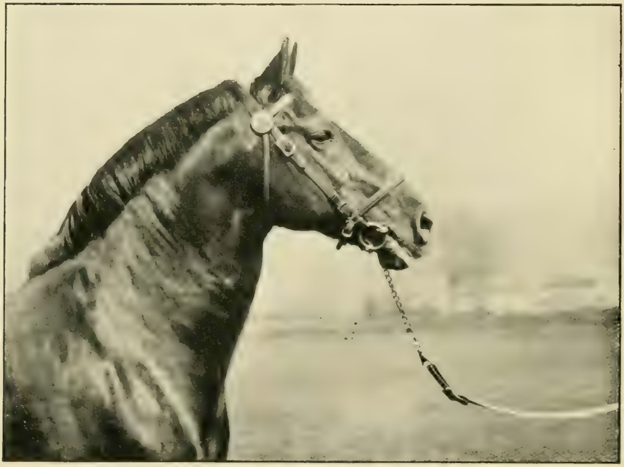
A. Hackney Pony Stallion, "Whitegate Swell."
Won at the Royal at York in 1900. A fine type of pony sire, that can walk six miles an hour.
Owner, John Jones, Whitegate Stud, Wrexham, Wales.
[*G. H. Parsons, Alsager, Cheshire.*



B. Hackney Mare, "Rosadora."
Champion Mare, Hackney Society Show, London, 1900 and 1904; special prize, 1907.
Owned by Chas. Galbraith, Terregles, Dumfries.
[*C. Reid, Wishaw.*

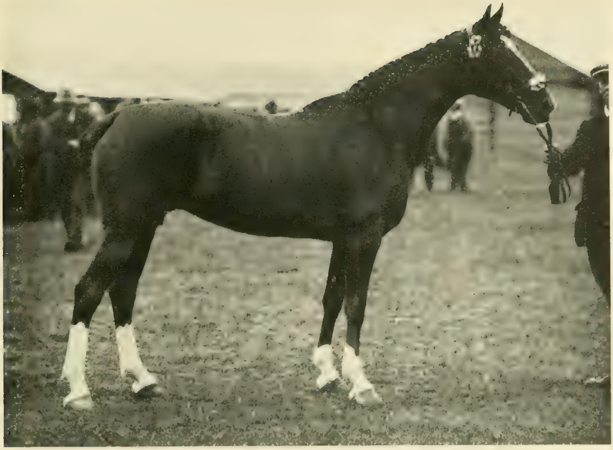


A. HACKNEY STALLION, "HIS MAJESTY," 15.2 h.h.
Aged, chestnut, noted prize-winner. His progeny included, "Forest King (Champion Harness Horse of the world, sold for £4200), "Diplomatist," "Knowle Belinda," "Aytoun Sweet Nancy," etc.
Owned by John Jones, Whitegate Stud, Wrexham, N. Wales.

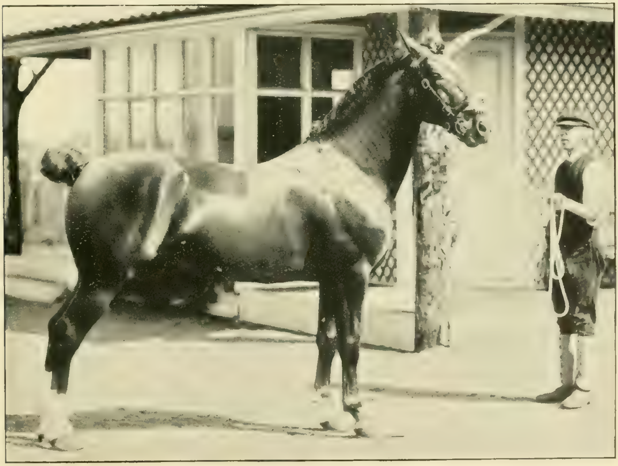


B. HEAD OF "HIS MAJESTY," described above.

[*Both by G. H. Parsons, Alsager, Cheshire.*

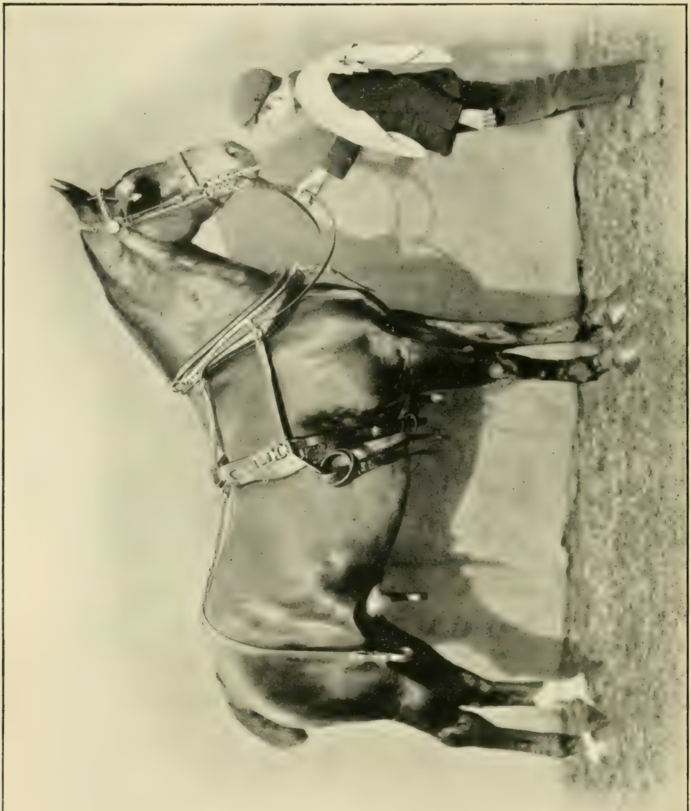


A. HACKNEY MARE, "CREAKE LADY."
First and Champion at the Dumfries Highland, 1922.
["*Agricultural Gazette*" *Photograph.*

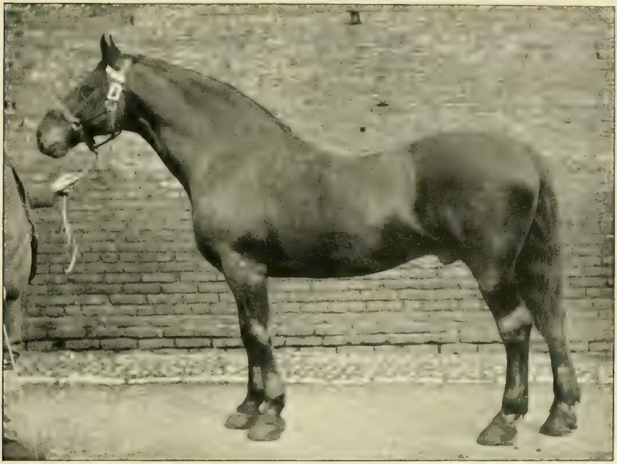


B. HACKNEY STALLION, "ROYAL DANEGELT."
Winner of many prizes, including a Champion Cup at the London Hackney Show, 1902.
The property of the late Sir Walter Gilbey, Bart.

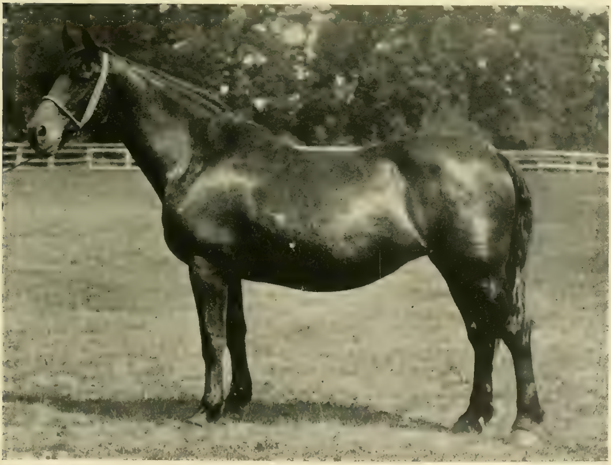
PLATE CXXII.



Hackney Carriage Horse, "Bestman," 17.1 h.h.
Bred and owned by the late Sir Walter Gilbey, Bart., Elsenham Hall, Essex.



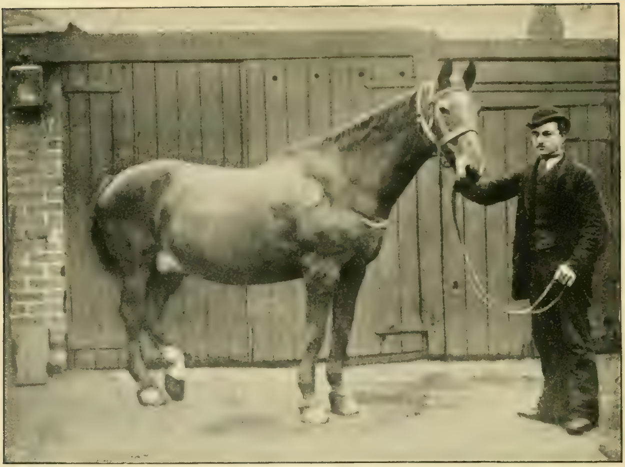
A. CLEVELAND BAY STALLION, "FIDIUS DIUS." Foaled 1871.
An excellent type of the old Chapman horse.
Owned by H. V. Webster, Northallerton.



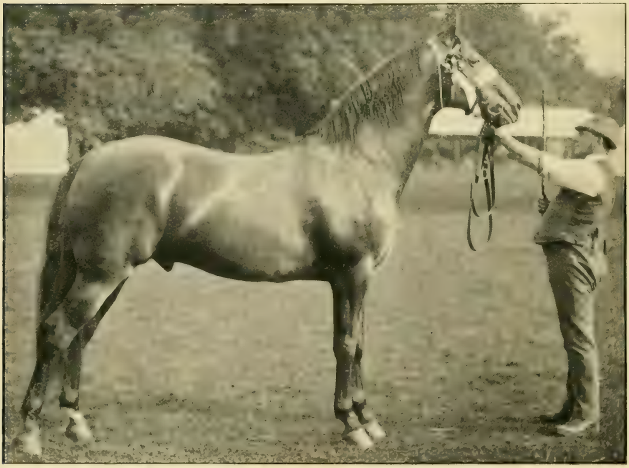
B. CLEVELAND BAY MARE, "MADAM."
Owned by H. C. Stephens, Cholderton, Salisbury.

[*C. Reid, Wishaw.*

PLATE CXXIV.



A. GELDING, MORE THAN HALF-BRED, 15.2 h.h.
Reputed to be 61 years at death in 1888, with evidence of his being at least 48.
Described by Sir John M'Fadyean in *The Veterinary Journal* at the time.
Skeleton in Royal Dick Veterinary College, Edinburgh. Owned by the late F. S. Petrie, Leith.



B. YORKSHIRE COACHING STALLION, "SALISBURY" (1888).
First prize, Royal Agric. Soc. Show, Warwick, 1892.

[*C. Reid, Wishaw.*

and was present at Atbara and at Omdurman. When brought to this country, being too hot for polo,[1] he was regularly ridden by his owner as a hack. He went successfully through the whole of the South African campaign. While two Blues' chargers died he survived the deadly time of horse-sickness experienced after the relief of Ladysmith. He returned to this country in September 1902, and passed to the stud. The best foal which "Mahmud" sired up till 1906 was out of a Transvaal mare. (See Appendix Q.)

Arab horse-breeding in England has taken a fresh start since the foundation of the **Arab Horse Society** in 1918.[2] The Society has an increasing membership, with H.M. King of Irak as its Patron. It has a twofold object:—first, encouragement in breeding of absolutely pure-bred Arabs, and none but these are admitted into its *Stud Book*; and secondly, crossing those with registered native mares—the produce going into the Arab-bred Register. The Society gave prizes for classes at Newmarket and Ranelagh in 1919 with satisfactory results, and its help was extended to the London Show at the Agricultural Hall in 1920. It provided nine classes for Arabs and Arab-breds at the London Show 1921, and a similar number in 1922; and at the Royal Agricultural Society's Show, of two classes, one is for Arab stallions and one for Arab brood mares. The Society yearly holds an Endurance Test (p. 827) of 300 miles in five days on the Sussex Downs for Arabs and Arab-breds. As these tests develop they will undoubtedly prove the endurance, soundness, and stamina of the Arab horse.

The leading owners of studs in England for the breeding of the pure-bred Arab are:—

H. V. Musgrave Clark, Oatlands, Lewis; Captain T. A. Clarke, Farran House, Farran, Co. Cork; A. Stanley Cochrane, Stoudon Manor, Brentland, Essex; Captain L. Edmunds, Cholderton Lodge, Cholderton, Salisbury; Sidney G. Hough, Springhouse Park, Theydon Bois, Essex; Captain J. Hamilton Leigh, Bindon House, Wellington, Somerset; Miss E. de la Pole, Tremar, Modbury, Devon; George H. Ruxton, Craven Lodge, Monk's Sherborne, Basingstoke; Captain the Hon. George Savile, Ditton Lodge, Thames Ditton; T. C. Armitage, Dene Court, Taunton, and the Right Hon. the Lady Wentworth, Crabbit Park, Three Bridges.

The Royal Commission on Horse-Breeding.—A Parliamentary Blue Book of 138 pages, containing the **minutes of evidence** taken before the Royal Commission on Horse-Breeding, was published in 1890, and the Tenth Progress

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[1] Not the usual drawback, size and weight putting the Arabs out of the running at polo with larger English ponies.

[2] Secretary, the Rev. D. B. Montefiore, 15 Wyndham St., Brighton.

Report was issued in 1905, signed by the Duke of Portland (*President*), Lords Coventry, Ribblesdale, and Middleton; Henry Chaplin, Jacob Wilson, John Gilmour, and J. Bowen Jones.

In the year 1888, certain money, which was formerly given in Queen's Plates for racing, was first diverted by the Royal Commission on Horse-Breeding to the encouragement of horse-breeding in Great Britain. The selection of the best horses entered for the various districts, was at first annually made in the March Show of Thoroughbred stallions suitable for getting half-bred horses, at the Royal Agricultural Hall, Islington, in connection with the Royal Agricultural Society of England, and the Hunters' Improvement, and the Hackney Horse Societies. In 1892, twenty-two "Queen's Premiums" of £200 each were offered for stallions of four years old and upwards, and these were distributed in six districts in England—three in each; and four districts in Scotland—one in each. The Royal Agricultural Society of England provided three additional stallions for another district of England, making, with the six districts already referred to, the seven produce districts into which the country has been divided in connection with the annual agricultural returns. In 1892 this Society withdrew its financial assistance. For eight years (1894-1901) twenty-nine **stallions** annually received premiums (later reduced to £150), but since that time the number selected was fixed for a time at twenty-eight. Until 1903, the judges selecting the horses were given no information beyond a record of the age and height of each animal. Now merit in performance in racing or steeplechasing after being checked by the Ministry is, with much benefit, taken into account.

The Royal Commission on Horse-Breeding ceased to operate in 1911 when the Ministry of Agriculture and Fisheries took over the duties, including the award of premiums to Thoroughbred stallions and licensing. Every stallion not under four or over twenty years old must be licensed by the Ministry under the Horse-Breeding Act, 1918 (an Act to regulate the use of stallions for stud purposes), before it can be accepted for entry at the Show, and must be free from the following diseases and defects — cataract, roaring, whistling, ring-bone (high and low), side-bone, bone spavin, navicular disease, shivering, string-halt, and defective genital organs. The number of stallions rejected for unsoundness diminished much; out of ninety exhibited each year, only five failed to pass veterinary examinations in 1905, against seventeen rejected in 1889. A fine of £20 is exacted if an exhibitor knowingly shows an animal suffering from contagious or infectious disease.

The average **value of a King's Premium** in 1921 was £345, paid by the Ministry :—

Premium of £200—half paid at the time of the award and half after the close of the season . .	£200	0	0
Service Fee of £1 a mare (average number, 65) .	65	0	0
Foal Fee of £2 for each mare which foals (average number, 40) paid at close of foaling season . .	80	0	0
	£345	0	0
A Service Fee of £1 a mare (average, 65) is paid by the owner, plus 2s. 6d. to the groom . .	65	0	0
Average earnings . .	£410	0	0

A stallion serving ninety half-bred mares would earn £490. "A record has been kept of all breeders who have had mares served by the premium stallions since 1888, for the benefit of the War Office and the Remount Department."[1]

The President of the Board of Agriculture appointed **a committee**, with Lord Middleton as Chairman, on 3rd August 1915, to secure the production and maintenance in England and Wales of a supply of horses suitable and sufficient for military purposes, especially on mobilisation. Its **Report** (Cd. 8134) was made to Lord Selborne on 8th October 1915. The following are among the **most important results** that accrued :—Registration of stallions; increase of the King's Premiums to fifty, including twelve Super Premiums of £100 each for stallions of exceptional merit; the number of mares served rose to 4318 or 86 per horse (corresponding figures in 1914, 3820 and 96); purchase of stallions suitable for country service; prizes for brood mares and foals; compulsory annual census of horses, and returns of horses exported and imported; the reduction of the service fee of a King's Premium stallion from £2 to £1, whilst the foal fee was increased from 12s. 6d. to £2; selected breeding mares to the number of 250 were sent home from France and sold at an average price of £31; the total number of mares served by the King's Premium stallions rose in 1915 to 3820 as against 3281 in 1913, resulting in a 58·09 percentage of foals; **Board's Premiums** were awarded to thirty-eight stallions (thirty-one Thoroughbreds, seven Hunters, and one Cleveland Bay) in place of twenty-eight in 1914, on recommendation by country committees; of 1760 mares served 53 per cent. held, and with the owner's Service Fee of £1, the average earnings of a Board's Premium stallion came to £157 and the maximum to £216.

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[1] **King's Premiums Thoroughbreds Notice** (19/1/22).—"Sixty King's Premiums will be awarded for thoroughbred stallions calculated to breed half-bred horses at the Hunters' Improvement and Light Horse Breeding Society's Show at the Royal Agricultural Hall, Islington, which opens on 28th February. According to the schedule which has been issued by the Ministry of Agriculture, the average earnings of each horse receiving one of these premiums, including the premium, is now £410. Twelve Super Premiums will be given to the best of the sixty horses that win premiums, while the King's Champion Challenge Cup will go to the best of the premium horses. All horses that compete for these premiums must be licensed by the Ministry of Agriculture under the Horse-Breeding Act, 1918, and there will be no veterinary examination at the Show itself. A limited number of Ministry's premiums will also be awarded, these having an average value of £270, and a possible value (if ninety mares are served) of £335. The entries close on 16th January, or, at a higher fee, 23rd January."

Six **Riding Pony** Stallion Premiums of £75 each were offered in 1915. Premiums of £5 each are also available for registered Welsh Cob stallions and **Fell**, **Mountain**, and **Moorland Ponies**. Premiums are allotted to **stallions to roam** selected districts of the New Forest and Welsh Mountains in which regulations under the Commons Act of 1908 are in operation.

NUMBERS OF STALLIONS OF EACH BREED *licensed* under the Horse-Breeding Act, 1918, in England and Wales, from 1st November 1920 to 31st July 1921—for one year only.

Light—	
Arab	21
Cleveland Bay	7
Hackney	191
Hunter	5
Thoroughbred	161
Welsh Roadster	3
Yorkshire Coach	3
Pony—	
Dales	17
Dartmoor	0
Exmoor	0
Fell	22
Highland	3
New Forest	1
Polo and Riding	19
Pony—*continued.*	
Shetland	9
Welsh	31
Welsh Cob	70
Heavy—	
Clydesdale	265
Percheron	38
Shire	2312
Suffolk	235
Non-Pedigree—	
Light	88
Pony	65
Heavy	242
Grand Total	3808

The Hunters' Improvement Society[1] entered its thirty-seventh year in 1921. Its objects, stated in Vol. IX. of the *Stud Book*, 1921 (eighteenth volume of the series), are:—

1. To improve and promote the breeding of Hunters and other horses used for Riding or Driving, and for Military purposes.

2. To give Premiums at Spring Shows, and obtain for breeders the use of sound stud horses at moderate service fees.

3. To publish *Stud Books* (the first nine volumes were *Records*) of Hunter Stallions, Mares, and Geldings, and use means to induce the various Agricultural Societies to offer prizes at their Shows for mares and young stock.

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[1] A. B. Charlton, Secretary, 12 Hanover Square, London.

4. To attract public attention to a subject so important to the nation, and to spread knowledge of the principles upon which a better class of horse may be bred.

The membership in 1921 numbered 2638, as compared with 1112 in 1896. The income for the year 1920, viz., £4652, included a sum of £773 received from the Ministry of Agriculture and Fisheries to cover the cost of organisation of the Spring Show of Thoroughbred stallions. Gold medals are offered annually by the Society at its own Show, and at the Shows of the three National Agricultural Societies; and there are over 100 Associated Societies which may secure gold, silver, and bronze medals if they offer prizes for hunter classes on published conditions which are calculated to encourage the breeding of good, sound animals. A list of stallions registered for service is annually added.

On 30th May 1904, the Council of the Hunters' Improvement Society appointed a **special committee** to "ascertain whether the present system of light horse breeding in the United Kingdom could be made more remunerative." Some special effort was felt to be necessary, owing to "the large increases in the importation of horses from foreign countries, and the danger lest the breeding of light horses should in consequence become neglected." It was elicited at the next meeting on 8th June that "there is a great deal of improvement going on" among a restricted number of high-priced animals, but "a greater amount of deterioration of the brood mares in the breeding districts, the retaining principle being entirely ignored in the whole system of horse improvement throughout the country." It was agreed that "the retaining of the brood mares in the breeding districts is the turning-point" of success. With the object of securing "the best practical and professional opinion on this national matter, ten questions were drafted and sent to (1) The Royal Commission on Horse-Breeding; (2) The Council of the Hunters' Improvement Society; (3) The Masters of Hounds and Secretaries of Hunts; (4) The owners and certain breeders of hunter stallions and mares; (5) The Secretaries of the Associated Shows; and (6) Selected Veterinary Surgeons. The replies returned numbered 466, covering a total of 4660 responses."

The Committee's Report to the Council of the Society indicated that there is "an almost entire want of system and scientific treatment in the production of light horses of the hunter type," but "a considerable desire in certain favourable localities to have the opportunity of producing suitable brood mares, and also stallions of the registered hunter type"—no less than 256 correspondents being in favour of this class of stallion. "In 1904 the Dutch Government took away 350 of the best young Irish mares," while this country pays the foreigner over £2,000,000 a year for horses which the present system of management does not supply at home. The reports expressed high approval of the efforts of the "Brood Mare Society," and recommended financial and other support. The need for "some organised effort to retain the good brood mares that are left" was strongly urged. The present scheme of King's Premium sires for encouraging Thoroughbreds of the highest quality was approved by 263 of the answers, but "an important minority voiced several desirable changes in the selection and type of these stallions," and the admission to the schemes of stallions registered in the *Hunter Stud Book*. The Committee recommended: (1) That a serious and sustained effort should be made to organise the hunter-breeding industry . . . and advised methods of rendering assistance in breaking and in selling horses, and co-operation among the producers themselves; (2) that the Hunters' Improvement Society should appoint a **Permanent Committee**, with power to add to their number with consent of the Society, to consist of its own representatives, and nominees appointed by The Royal Commission on Horse-Breeding, The Brood Mare Society, The Board of Agriculture, The War Office, and The Department of Agriculture and Technical Instruction for Ireland."

The type of registered hunter sires to be created was to be "bred with a special view to bone, substance, constitution, shape, and endurance, and in these respects their manner of production would differ from that of the Thoroughbred, which is bred mainly for speed." To make the industry remunerative and to supply the home demand, it was necessary "to raise the standard of excellence, diminish the proportion of misfits or failures, and cheapen the cost of production."

The following suggestions appeared in the minutes of evidence taken by the Special Committee: "(1) That the King's Premium horses in the United Kingdom should be considerably increased under the auspices of the Royal Commission on Horse-Breeding, if the Commission see their way to recommend this. (2) The Government should distribute among suitable farmers of the United Kingdom the cast mares from artillery and cavalry, free from hereditary diseases, and suitable for breeding purposes, to be used quietly on the farms. (3) The mares, the property of the Government, being lent to farmers for breeding purposes, to be returned to the Government should they not breed. (4) The Government to pay the service fee for a premium or registered sire, and to have the refusal of the produce at three-years-old-off, if it pass the veterinary surgeon; and to be taken at the fixed minimum price of £35 on 1st September, if bred as stated. (5) That small prizes of from £2 to £5, according to the number of entries, should be given at Country Shows for the best and most suitable animals, undocked, when the Government inspector might claim all shown in these classes at £35 each, if suitable. (6) On 1st September the selected animals would become the property of the Government at the prices agreed upon, and the sum be paid at once to the owner, he in turn agreeing to keep the animal in healthy condition for one year more or less, at the rate of 4s. per week; should the horse not remain in good condition, the Government reserve the right of reducing the amount to be paid for keep. (7) The purchased animals to be branded or marked in some way to identify them whilst in the farmers' possession, and a local person living in each district appointed to look after the mares lent, and the produce, who shall report in the first place to the Secretary of the Hunters' Improvement Society, who will then communicate with the War Office."

After a full discussion, recorded in Vol. VII. of the *Hunter Stud Book*, 1898, whether or not only Thoroughbred stallions should be admitted to the Register of hunter sires, it was then decided, under necessary safeguards, that a sire need not be a registered Thoroughbred if the foreign strain were of a quality which had won races under Jockey Club or National Hunt rules. **A supplement** to the *Stud Book* was then opened for mares and fillies without registered numbers—the test being inspection under the Council's regulations, or prize-winning at recognised Shows. The supplement was intended to be a feeder to the *Stud Book.*

Since the last edition of this work, sundry amendments of the Society's activities have been introduced.

The **Spring Shows** have maintained their characteristics, though the aftermath of the war has influenced the scope of the schedule of prizes. The scheme of **Service Premiums** for Thoroughbred stallions to serve the mares of tenant farmers, inaugurated by the Society and maintained by the Royal Commission on Horse-Breeding, has been enlarged by the Ministry of Agriculture and Fisheries. Sixty King's Premiums are annually awarded, with twelve **Super Premiums** for stallions of exceptional merit, and from such twelve the judges select the Champion stallion, which retains for a year the Champion Challenge Cup, offered by His Majesty the King. The Board of Agriculture for Scotland have utilised the Spring Shows for their selection of six King's Premium stallions to serve in Scotland, and the combined schedule absorbs an approximate annual outlay of £23,500.

The sequence of exhibitions at the Royal Agricultural Hall was broken in 1918 and 1919, when circumstances forced the Society, in company with its sister organisations, to emigrate to the Park Paddocks, Newmarket, generously placed at their disposal by Tattersalls. The exigencies of the moment necessitated the restriction of the schedule to entire animals, which, while not affecting the Thoroughbred section of the Show, restricted the Hunter Schedule to very small limits. The return to London in 1920 has enabled the Council to revert to the pre-war schedule for young stock, with a restricted programme in the riding section. The **average annual entry** of Thoroughbred stallions has been 100; it rose during the war—owing to the restrictions on racing—to 175 in 1917, was 156 in 1918, and 133 in 1919. It has fallen back to normal figures since the Royal Agricultural Hall was freed from Government control, viz., 106 in 1920, and 97 in 1921.

Probably no section of the agricultural world has suffered more than the **breeder and owner of light horses.** Patriotically sacrificing valuable animals at the commencement of the war for nominal values, he has as a breeder practically to start afresh. Prices except for the finished article are against him, with the result that many have gone out of the business. This result is reflected in the Society's Spring Show. Entries in pre-war days ensured a representative class of 100 young stock and 100 or more riding horses. In 1920 these figures were halved, and, though 1921 indicated a revival, the movement is bound to be slow, and it will take years to assure a return to the conditions that operated prior to August 1914. There is a distinct promise of improvement in the returns of the affiliated **County Shows**, as the increase in the hunter classes is evidence of a corresponding interest among the owners and breeders of hunter stock. The service returns of the King's Premium stallions published in each volume of the *Hunter Stud Book* fully bear out this. These **County Shows** are invaluable as feeders to the Spring Show as they bring out promising young animals, and the best usually find their way to Islington in the following year, to try conclusions with other successful competitors from the counties. When the war practically extinguished the County Show, the *Stud Book* entry and the membership of the Hunter Society declined. With their resumption the tide turned and both benefited. In due course the resulting influence will make itself felt at the London Shows.

The Brood Mare Society was established in 1903, "for the purpose of obtaining (free from hereditary disease, *strong* hunter-bred) mares by gift or purchase, and lending them to farmers and others on certain conditions, the object being to keep good brood mares in the country, and restrict their wholesale exportation and the consequent deterioration in the breed of horses in the United Kingdom." The Brood Mare Scheme inaugurated by the Society—whereby mares of suitable type are loaned out at a nominal annual charge—was taken over by the Hunters' Improvement Society and eventually became a concrete part of the Government Scheme. The difficulty of disposing of the progeny, and the necessary limiting of the work to be undertaken by the loaned mares, have not tended to popularise the scheme, which at the present time is practically inoperative. The Society has therefore on its own initiative and out of its funds inaugurated a new scheme, described in the 1921 **Report of the Council**:—

A special committee of the Council exhaustively explored the condition of the Light Horse Breeding Industry, after the thirty-fifth general meeting in February 1920, and presented recommendations on which action was taken. The supply of Thoroughbred stallions has been arranged through the grant to their owners, administered by the Ministry of Agriculture and Fisheries, and by the Board of Agriculture for Scotland. As a result of the Council's anxiety to have similar advantages extended to the owners and breeders of mares and fillies, a scheme for 1921 was published, by which fifty premiums of £20 each were awarded at selected shows throughout England and Wales—premiums open to brood mares and three-year-old fillies (suitable for breeding hunters under conditions made as elastic as possible), viz. :—

(*a*) The retention of the brood mares and fillies in the hands of their owners ;
(*b*) The soundness of the selected mare ;
(*c*) The production of a living foal to a Thoroughbred horse or registered hunter sire.

Full details are given as to the allocation of the grant in the following summary :—

Division.	Number of Shows.	Premiums.	
		Brood Mares.	Fillies.
Northern	9	6	6
Eastern	6	3	5
Western	6	6	3
Midland	10	7	7
South-Eastern	2	1	2
South-Western	4	2	2
	37	25	25

This scheme will be in addition to the normal activities of the Society at the affiliated shows, with the two provisos :—

No affiliated society can claim a gold medal for brood mares if it elects to offer one of the premiums of £20, or *vice versa*.
No owner can take more than one of these premiums in all in 1921, and no mare can take more than one premium.

DETAILED ALLOCATION OF THE GRANT FOR BROOD MARES AND THREE-YEAR-OLD FILLIES (Suitable for breeding Hunters).

Society.	Premiums.	
	Brood Mares.	Fillies.
Northern.		
Border Union	1	...
Cheshire	1	...
North Lonsdale	...	1
Northumberland	1	1
Royal Lancashire	...	1
Stokesley	1	...
Tyneside	...	1
Westmorland	1	...
Yorkshire	1	2
Eastern.		
Essex	1	...
Hertfordshire.	...	1
Lincolnshire	...	1
Peterborough	1	1
Royal Norfolk	1	1
Suffolk	...	1
Western.		
Bath Horse	1	1
Beaufort Hunt	1	...
Herefordsh.&Worcestersh.	1	...
Kington (Heref.)	1	...
Montgomeryshire	1	1
Shropsh. and W. Midland	1	1
Carry forward	15	14
Brought forward	15	14
Midland.		
Bedfordshire	...	1
Bicester	...	1
East Berks	1	1
Leicestershire	1	1
Meynell Hunt	1	...
Northamptonshire	1	...
Oxfordshire	...	1
Royal and Central Bucks	1	...
Rutland	1	1
Warwickshire Hunt	1	1
South-Eastern.		
Sussex	...	1
Tunbridge Wells	1	1
South-Western.		
Brentor and Lydford	1	...
Devon County	1	...
Wiltshire	...	1
Yeovil	...	1
	25	25

The *Hunter Stud Book* is open to stallions, mares, and geldings. **Pedigree and performances** are the essential conditions of entry for the two last sections, while stallions are admitted under the following rules:—

A stallion, two-years-old and upwards, shall be eligible for registration provided that his pedigree has been submitted to the Editing Committee and the horse inspected by a member of the Society nominated by the Editing Committee, who accept or reject the stallion :—

(*a*) After the pedigree has been considered by the Committee ; and

(*b*) the horse been examined by the Veterinary Inspector appointed to report upon soundness and measurements ;

(*c*) the Editing Committee appoint a member to inspect and report.

(*d*) The owner pays to the Society all expenses of examination and inspection.

The activities of the Society are not confined to the essential objects of its incorporation. During the war it took an active part—if not the initiative—in pressing upon the Government the necessity of encouraging the breeding of light horses; the conservation of pastures; the rationing of breeding stock; while only recently it has utilised its resources and representative clientele to conform to Parliamentary findings affecting the breeders of horses, the docking of horses, the proposed export tax, and the conditions of the roads for horse traffic.[1]

The late **Algernon Turnor**, Goadby Hall, Melton Mowbray, specially prepared the following historical notes for the last edition:—

"It is only in time of peace and by the exercise of foresight many years in advance, that adequate provision can be made to supply sufficient military horses even for the commencement of some future war. This object can only be attained by improving the quality, increasing the value of the article produced, and making the industry remunerative. It has been the endeavour of the above-named Societies not only to keep this end in view, but also to organise such a system of national horse-breeding as may be handed down to future generations. It is therefore interesting to trace the steps by which the system is being constructed.

"A motion, brought forward early in 1903 in the Council of the Hunters' Improvement Society, to try the experiment of acquiring and placing out in selected districts a number of suitable brood mares, though rejected at the time, led to the formation towards the close of that year of the Brood Mare Society, which was instrumental in calling together an influential meeting at Bridgewater House in 1905, under the Presidency of the Earl of Minto, and which collected by voluntary effort sufficient funds to inaugurate its system and try its machinery.

"On 16th July 1906 the Earl of Donoughmore, President of the Brood Mare Society, brought forward a motion in the House of Lords, urging His Majesty's Government to give effect to the recommendations of the Royal Commissioners on Horse-Breeding, as set forth in their Tenth Report to Parliament, especially with reference to the provision of mares. The resolution was accepted by the Government, and, on 31st October 1906, the President of the Board of Agriculture summoned a Conference at Whitehall, which was numerously attended by members of the Royal Commission, of the Hunters' Improvement Society, of the Brood Mare Society, of the Royal Agricultural and many other Societies, all of which are interested in this important question.

"An interesting and instructive discussion, initiated by the Rt. Hon. Henry Chaplin, ensued, which resulted in an important memorandum being prepared, setting forth the conclusions arrived at by certain representatives, who took part in the Conference. The proposals in that memorandum are, briefly, that the Government should set aside some £25,000 a year in addition to present expenditure, and lay it out under the following heads:—(1) A portion to be spent on purchasing suitable mares, and placing them out with the help of the Brood Mare Society; (2) a portion to be used in advancing loans to individuals or Societies to purchase suitable sires, or expended by the Government in purchasing them and letting them out; (3) a portion to be spent in giving additional prizes in cases where the Government regulations are carried out; (4) a portion to be devoted to expenses; (5) a competent committee to be appointed to assist in giving effect to the above. These suggestions received the unanimous support of the Council of the Hunters' Improvement Society and of the Brood Mare Society, and were submitted to the President of the Board of Agriculture, with a view to action on the lines indicated."

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[1] For the foregoing information later than 1907, indebtedness is acknowledged to A. B. Charlton, Secretary.

ARMY REMOUNTS.

The **Classes of Horses** required for the **Army**[1] may be generally described as consisting of two types—the Cavalry or hunter type and the light draft horse that can "trot on." Only horses with good action are taken. "Entire horses are not purchased, nor are those which are docked, unmanageable, vicious, crib-biters, wind-suckers, or parrot-mouthed. Soundness in eyes, wind, and limb is essential, and no horses are accepted with worn, upright, or overshot joints, with curby hocks, or with bad teeth." A few white or light grey horses are purchased, but only for special objects; "other very light and washy coloured horses not being suitable for Army purposes." As a rule the age is from four to seven, and in some riding horses three years. A liberal market price is promised for suitable animals.

Officers' Chargers (Cavalry type) should not exceed 16 hands at six years, and should be well bred and of the hunter type, active, well ribbed-up, short in the back, with plenty of bone, and good head and shoulders. *Officers' Cobs* (for all units other than Staff, Cavalry, Horse and Field Artillery, and R.A.S.C. units) should not be less than 14·2 and not more than 15·1 hands: "the class of riding cob that has a short back, is deep through the heart, has a nice length of rein, stands on good legs and feet, and has true action." *The Household Cavalry Trooper* must have quality and must be able to carry weight. As they are chiefly for escort duty in London, they must look well and have a certain amount of action. The price paid is above that of the ordinary cavalry troop horse; the colour is black and the height at four years 15·3, and at five years 16 hands. *The Cavalry Trooper* (Line) is a deep bodied animal, has a short neck and well sprung ribs, and belongs to the hunter type, with substance, quality, and true action. The *Horse Artillery Draft Horse* is of the well-bred "ride and drive" type, a good true walker, able to move with Cavalry, "to gallop in a gun team and to maintain the pace for a considerable distance; short in the back, deep through the heart, with plenty of bone and strong quarters to hold the gun in the breeching; height at four years 15·1½ to 15·2½, over four years 15·2 to 15·3. *Field Artillery and other Light Draft Horses* require to be of the best type of the active light vanner, similar to those of the R.H.A., but with less quality and pace and a little more weight. They must be capable of moving at a fast trot over rough, broken ground pulling a big weight.

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[1] Miscellaneous (free) Publication, No. 10, Ministry of Agriculture and Fisheries: *Types of Horses Suitable for Army Remounts*, 1920.

Heavy Draft Horses, for Heavy Artillery Batteries and for Army Service Corps, are of the short-legged, short-backed, compact, active type of cart horse on good legs and feet. The less feather the better and that never coarse or curly; height not exceeding 16·1 and weight at six years old 1400 lb.

THE HACKNEY OR "NORFOLK TROTTER" BREED

Is said by Lawrence to have sprung on one side of its ancestral descent from the Norwegian horse. Anyhow it is found in Norfolk and Yorkshire, where the Norse invaders had their principal strongholds in this country. The peculiarity of its action, as indicated by its name, is the most important difference between the Hackney of the present day and the Thoroughbred. The breeds have both been freely crossed by imported horses from the same foreign stocks. The form, however, has also differentiated with difference in surroundings, and the difference in the objects for which they have been bred. It is to the original native mares in each case that the trotting habit of the one and the galloping habit of the other are due.

The modern Norfolk Trotter was remodelled from the earlier trotter of Norfolk and the Fen country about the end of last century, by the use of Shale's or Shield's horse, or "Scott Shales" (692), which infused much of the Thoroughbred Arab and Barb blood, and gave fine bones, pace, and staying power to the heavy, round-boned, and more or less cart horse-shaped trotter of the beginning and middle of the century. The **original Trotter** varied in size from the farmer's market cob to the regular cart horse of the country, to which the Suffolk Punch is no doubt directly related. There are no reasonable grounds to doubt that the free action of many of our cart-horses and the action of the hackney had a common origin in an early British horse. It was formerly a custom in Norfolk to trot the cart horses when returning with the empty cart or waggon—a fact which indicates that they were at one time lighter and more active than those of the present day. Their increase in weight can, however, be accounted for by the crossing which took place between the original breed (described as "small, brown-muzzled, and light-boned") and Lincolnshire and Leicestershire Black or "Great Horses."

Among the **Yorkshire Trotters** the same process of improvement was carried out about the same period. Thoroughbred Arabian blood was largely used through the employment of a good horse named "Sportsman" and his descendants. It is owing to the presence of an abundance of Arab blood in the

Hackneys of Yorkshire and of Norfolk that it is now possible to cross the two varieties with satisfactory results, and to maintain them as they now exist in the same *Stud Book*. At an earlier date, and so late as 1775, crossing in this way was not advisable, as it is recorded[1] in reference to Norfolk horses, that "not a single horse of any repute has been produced from these half-bred horses brought from Yorkshire or elsewhere."

The **Hackney horse of to-day** should be "a powerfully-built, short-legged, big, broad horse, with an intelligent head, neat neck, strong, level back, powerful loins, and as perfect shoulders as can be produced; good feet, flat-boned legs, and a height of from 15.2 to 15.3½ hands." Plate CXXII. shows that Hackney-bred carriage-horses over 17 hands can also be produced.

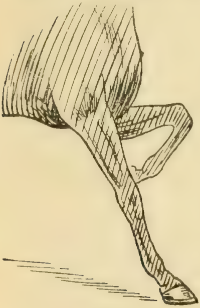

FIG. 55.—FAULTY TROTTING ACTION.

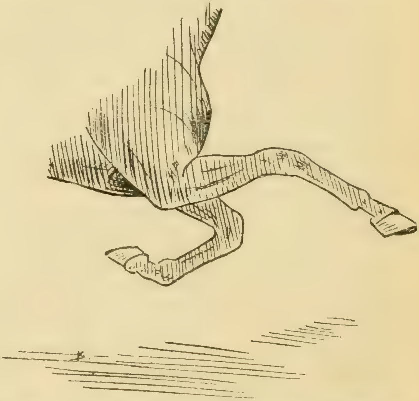

FIG. 56.—PERFECT ACTION AND FORMATION.

From Galvayne's *Twentieth Century Book on the Horse.*

Hackneys have been largely **exported** to all parts of the world. They have been taken to India as stud horses[2] for breeding Army remounts by the native mares. The Yorkshire variety possesses the necessary qualities for the purpose in a greater degree than the Norfolk.

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[1] In the first volume of the *Hackney Stud Book*, 1884, to which the Author is indebted for many details of the early history.

[2] The Report (1892) announcing the transference of the management of horse-breeding operations from the military to the civil authorities, says:—"The stallions at the end of the year numbered 367, Norfolk trotters being most numerous, and most popular with native breeders. An improvement in horse-breeding is noticed."

Official encouragement of Light Horse Breeding in Scotland is under the Board of Agriculture for Scotland. Scheme No. 9 dealing with it, is detailed in "Regulations and Conditions of the service of Mares by King's Premium and Board's Premium Stallions," to be had on application to the Secretary, York Buildings, Edinburgh.

THE CLEVELAND BAY,

A branch of the **old Coaching or Chapman horse**,[1] is now mainly to be seen in Yorkshire, although at one time its habitat covered a much wider region. The breed was in a most flourishing condition for about two decades subsequent to the middle of the nineteenth century, after which period it declined. It, however, sustained its worst blow at the time when the advent of railways led to the reduction of the demand for stage-coach horses, and when it became fashionable to breed carriage-horses and other light-legged horses by mating a Thoroughbred horse with a light farm mare. By this means also the Cleveland became stained to some extent by the introduction of foreign blood. Within recent years much greater attention has been paid to the preservation and improvement of the breed. The *Stud Book*—the first volume of which was published in 1884—has proved a distinct source of interest, and a means by which the best qualities of the original breed may yet be brought prominently forward. There is a tendency—due, it is said, to in-breeding, but no doubt also to the Thoroughbred cross—to a lighter condition of bone than that natural to the old Cleveland horse.

The Farmers' Magazine for 1826 said :—"Probably the best horse for working the lighter class of soils is the Cleveland Bay, an original breed of the country, 'neither blood nor black,' that is, a distinct race from the English Blood-horse, and equally distinct from the Black or Cart breed of the country. It was the basis of the breed of the old London coach-horse, when heavy cattle were used for these conveyances; and, after it became the fashion to adopt a lighter horse for carriages, this valuable breed was allowed almost to become extinct, till their excellence for agricultural purposes was noticed by some practical farmers in the North of England, who for several years have been exerting themselves to revive the breed."

Vol. I. of the *Royal Agricultural Society's Journal* gives the dimensions of a Cleveland stallion introduced by J. B. Lloyd into Gloucestershire about 1827, to cross with the local breed of cart horses, in order to gain more activity with little or no diminution of strength, as follows :—"When 'Old Cleveland' was at his full size, in good condition but not full of flesh, he measured 16 hands 1½ in. high, 9⅝ in. round the pastern, 10 in. round below the knee, 21 in. round the arm, 15⅝ in. round the knee, and 6 ft. 10 in. round the girth. His legs were as clean as a race-horse."

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[1] See Appendix X, "Pack Horse."

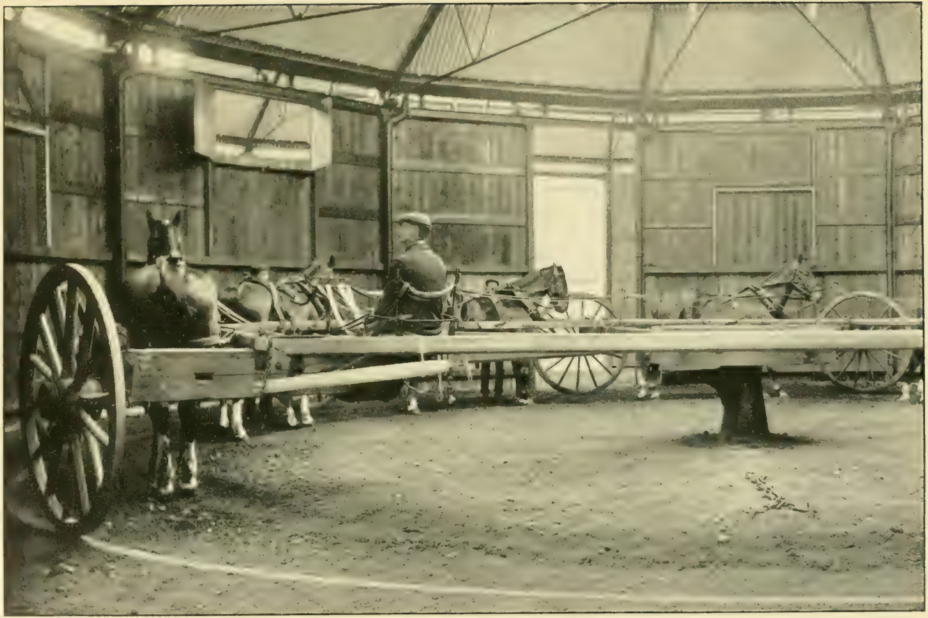
These quotations tend to confirm the view that at one time the Cleveland was a heavier horse than he is now.

Hayes traces the **origin of the Cleveland Bay** to a cross between Yorkshire cart mares, the direct descendants of the old "Great Horse" of the country, and a Barb which introduced the bay colour and the dark dorsal stripe characteristic of the breed. Descent is claimed for it from the war-horse of the ancient Britons, and Cæsar's account of their use of chariots in war is quoted as referring to it, although at that time the size must have been much smaller than at present. Horses, it is now thought, were employed in the war-chariot, the world over, long before they were large enough to carry a rider into battle. The Greeks, Romans, and Egyptians all had war-chariots, and likewise the Aryans from Central Asia when they invaded India 1400 years B.C.

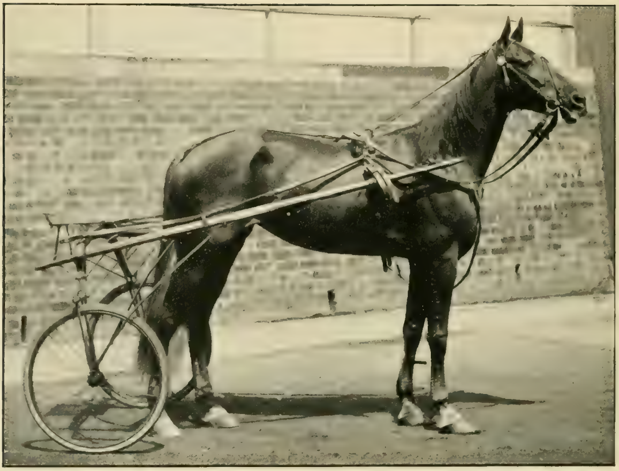
The **mode of chariot warfare** of the ancient Britons was as follows:—"First they ride about in all directions and hurl their darts, and by very terror of their horses and clashing of the wheels they frequently throw the ranks into disorder; and when they have penetrated between the divisions of the cavalry, they leap down from the chariots and fight on foot. The charioteers, in the meanwhile, edge out of the battle by degrees, and so dispose of the chariots that if they are pressed by large numbers of the enemy they have a ready means of retreat to their own men. Thus they possess the rapidity of cavalry and the stability of infantry in battle, and by daily use and practice they become so proficient that in steep and precipitous places they are accustomed to maintain their horses at full speed and in a moment to check and turn them, and to run along the pole and to stand upon the yoke, and from thence to dart back into the chariots as quickly as possible."—CÆSAR.

"The war-chariot comes on like the flame of death, the rapid chariot of Cuthullin, the noble son of Semo. It curves behind like a wave near the shore, like the sun-streaked mist of the heath. Its beam is of polished yew, its seat of the smoothest bone, its sides are replenished with spears, the bottom is the footstool of heroes."—OSSIAN.

Those who are interested in the Shire horse are equally certain that the passage from Cæsar refers to that breed. The probability is that both claims are equally well founded, and that the differences which now exist, admitting that they are

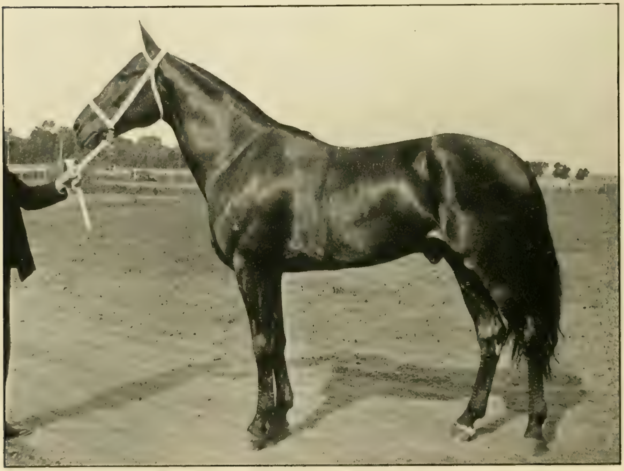


INTERIOR VIEW OF THE DRIVING SCHOOL IN WHICH THE LATE SIR WALTER GILBEY'S HORSES WERE BROKEN AND EXERCISED, Elsenham Paddocks, Essex.

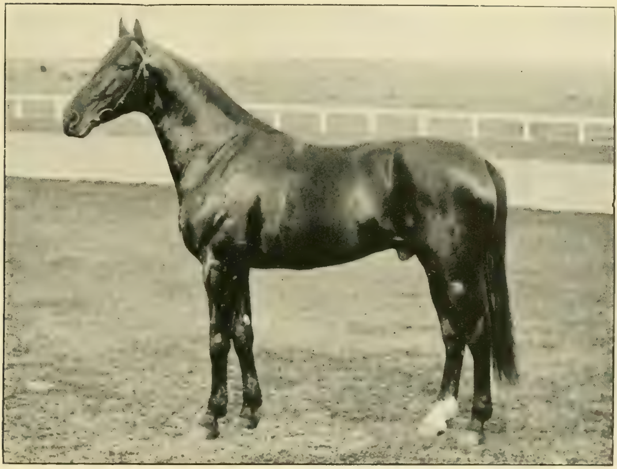


A. American Trotter, "Rustic Beauty."
Record, 10 miles in 27 mins. 52½ secs. in 1900.
Owned by T. Smallwood, of Manchester.

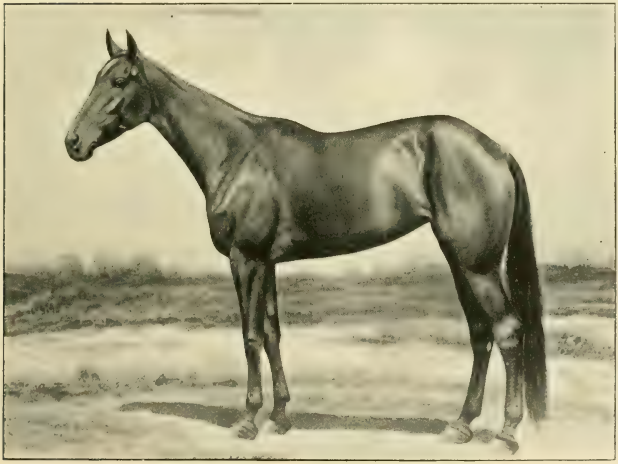
[*G. H. Parsons, Alsager, Cheshire.*



B. American Pacing Stallion, "Dan Patch," 1.56.
"Champion Harness Horse of the world." See page 504.
Owned by M. W. Savage, International Stock Food Company, Minneapolis, Minn., U.S.A.



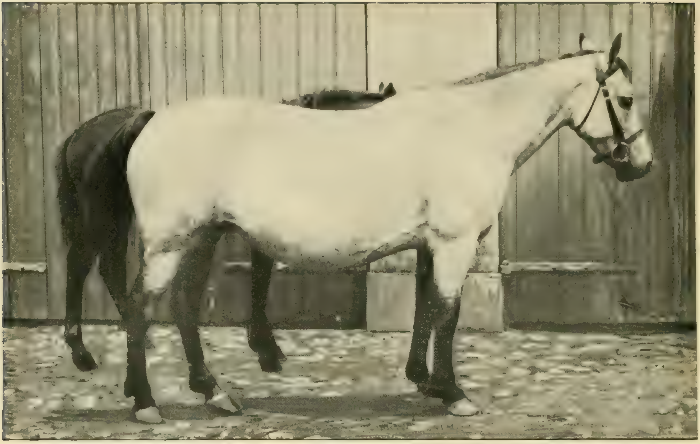
A. Trotting Stallion, "Almont."
First and Champion, Royal Agric. Society of Victoria, 1904.
Holder of the world's record, 3 miles, 6 mins. 50 secs.; made at Ascot, Victoria, 1903.
Owner, A. J. B. Sharp, Hartlands Stud Farm, near Melbourne.



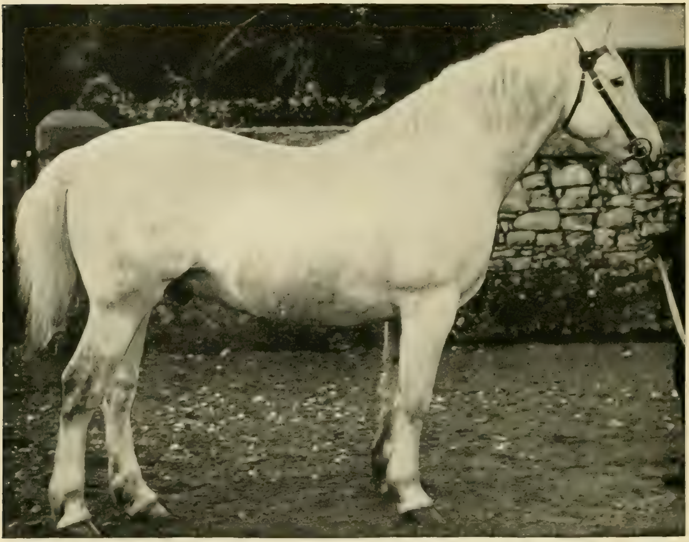
B. American Trotter Mare, "Sunol," 2.8¼.
The property of Robt. Bonner, 8 West 56th Street, New York. See page 501.

[Schreber & Sons, Philadelphia.

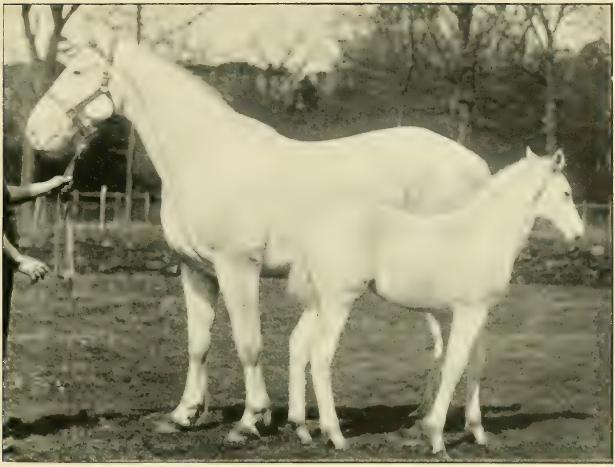
PLATE CXXVIII.



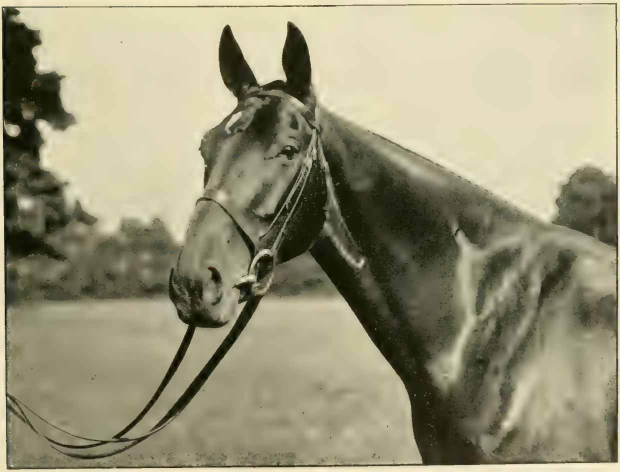
A. Connemara Pony and Foal.
Owned by W. A. Byrne, V.S., Castlestrange, Co. Roscommon.



B. Irish Draft Stallion, "Prince Henry."
Owned by M. J. Cleary, Bishopstown Moate, Co. West Meath.
[*From "The Journal of the Board of Agriculture and Fisheries for Ireland,"* Oct. 1904.



A. Milk-White Hunter Mare, 9 years old, by "Bonaparte."
Bred in Yorkshire; sold by J. H. Stokes, Leicestershire, to J. B. Thorneycroft,
Netherplace, Mauchline, to breed hunters. The foal born March 1904;
by "The Rush," a dark chestnut, by "Barcaldine," out of "Whirlpool."

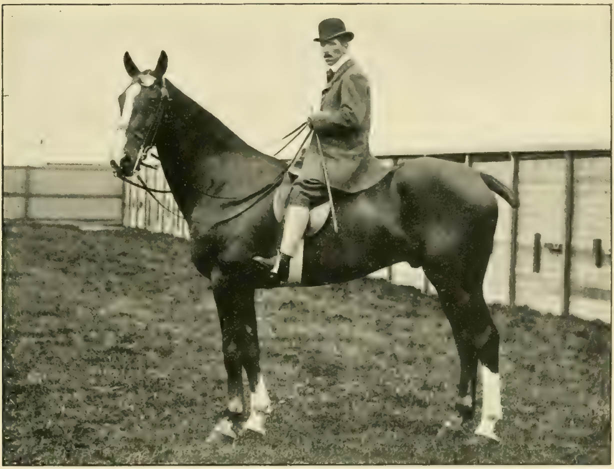


B. A Typical Hunter's Head.

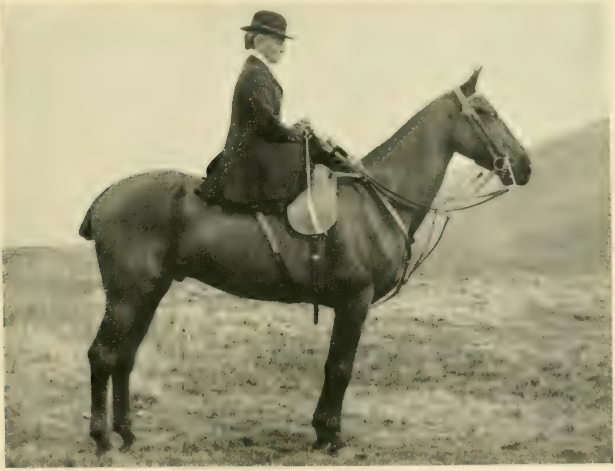
[G. H. Parsons, Alsager, Cheshire.

A. HUNTER GELDING, "GRANDEE."
First and Champion at the Hunters Show, Islington.
Owned by J. H. Stokes & Sons, Nether House, Market Harborough.
[*From a painting.*

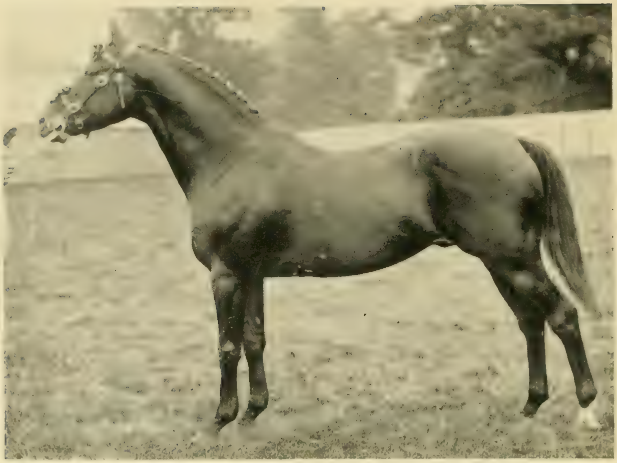
B. THOROUGHBRED HORSE, "RIVERSTOWN."
A model Hunter sire.



A. Heavy-weight Hunter, "Orator" (Chestnut, 6 years old).
Sire "Oriflambe"; won First at Newark, Peterboro, Essex, and Leicester, and the Fifty-Guinea Champion Cup at the Royal Lancashire, etc.
Owned by J. H. Stokes, Nether House, Great Bowden, Market Harborough.

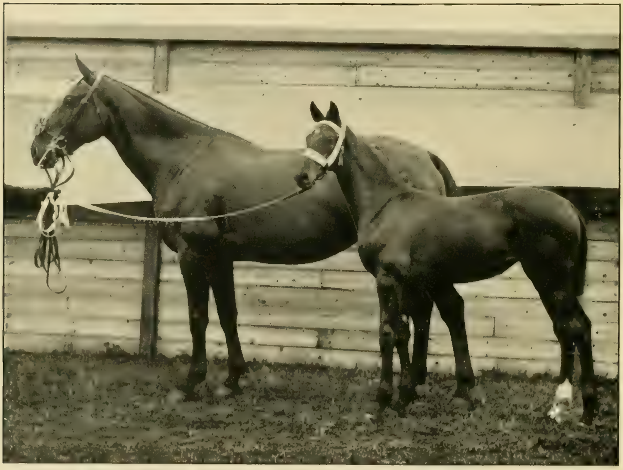


B. Hunter and Polo Pony, "Peter."
Bought by Chas. Herdman, Friars Hall, Melrose, from a baker's van, after being a machine-gun pack-horse in France—a wonderful performer. Miss Blackburn in the saddle.



A. ENGLISH THOROUGHBRED, "ROSEWATER." Polo Pony sire.

[*C. Reid, Wishaw.*



B. HUNTER BROOD MARE, "SPECULATION," AND FOAL, "SPENDTHRIFT."
First, Tunbridge Wells, and £50 Cup, Royal Lancashire, 1905.

[*Photo by G. H. Parsons, Alsager, Cheshire.*

great, have been produced since Cæsar's time by "crossing" in different directions and with different objects in view.

Lloyd's description of the Cleveland horse, quoted from the *Cleveland Stud Book*, says:—"From 16 hands 1 in. to 16 hands 2½ in. in height, he should be possessed of good, sloping shoulders, a short back, powerful loins, and long quarters. His head is rather plain than otherwise, and on the large side, but it is well carried, and his general appearance denotes activity and strength combined in a manner not seen in any other breed. His action is not remarkably high, but it is the kind of action for getting over the ground. In colour he is bay—either light or dark—with black legs, clear of hair; and black zebra-like stripes on the arm and above the hock are sometimes seen. These are known as the black points, and are supposed to denote special purity of breeding. White, save a small star or a few white hairs in the heel, is not admissible, a blaze or a white foot proclaiming at once the admixture of foreign blood."

The *Stud Book* points out that nearly every horse of note belongs to one or other of three great families—the descendants of "Dart" (83), "Barley Harvest" (447), and "The Hob Hill Horse" (316). Those who have carefully followed the previously detailed histories of many other breeds of live stock will remember that this is in no way an unusual circumstance, but is, on the contrary, one of frequent occurrence.

During the **war years** there was a heavy drain on Cleveland Bays, as on all breeds. Then again, for one reason or another, stallions were not so plentiful as they had been; men bred from Thoroughbred blood if they bred at all; and there was also a lack of enterprise in registering in the *Stud Book*. This, though to be deplored, was not to be wondered at during a time of war stress. No doubt this accounts to some extent for the shortage of entries which has done something to limit the number of brood mares of undoubted purity of descent at a critical period in the history of the breed.

The Council of the Cleveland Bay Horse Society consequently decided to admit a limited number of mares (forty) by inspection. There is no doubt that there are many good-looking and valuable mares, in which Cleveland Bay blood largely predominates, that could not be registered according to the old rules. That these should be brought into line is highly desirable, and, though of course there are some who object strongly to such a policy, it is difficult to see what else could have been done. The critics seem to forget that the famous stallion "Sultan" was from an "inspected" mare. "Foundation stock" introduction is no new policy with the Society, it having been adopted for a limited period in the early days of the Society's existence.

THE YORKSHIRE COACH-HORSE,

From the North and East Ridings of Yorkshire, is a breed of more recent formation than the Cleveland. The following quotation from the preface of the *Yorkshire Coach-Horse Stud Book*, 1887, indicates in a few words its recent origin and general characteristics:—

"It cannot be claimed for the Yorkshire coach-horse that he is a pure-bred animal, but on the contrary, by the judicious crossing of large-sized good-coloured mares with stallions altogether or nearly thoroughbred, a class of horses has been produced suited to the wants and circumstances of the times. By universal consent the colour should be bay or brown, with black eyes, mane and tail abundant but not curly, the height from 16 hands to 16 hands 2 in. with fine head, sloping shoulders, strong loins, and lengthy quarters, high-stepping action, good sound feet, flat legs, and abundance of bone and muscle."

The coach-horse has rightly or wrongly been described as an improved Cleveland. Springing from the same county, there are good grounds for believing that the two breeds are related through some of their progenitors. The high action of the coach-horse would indicate that it may in the same way claim kindred with the breed of trotting horses which has aided in making Yorkshire famous as a horse-breeding county. It is an established fact that much of the "quality" of the coach-horse has been derived from the fountain-head of "quality," the English Thoroughbred, and from the breeds from which the Thoroughbred was formed. On this point the preface already quoted says:—"Amongst the oldest noted sires of celebrated coach-horses is 'Dunsley's Dart,' descended on his sire's side from 'The Darley Arabian.' 'Dunsley's Dart' was the grandsire of 'Agar's Dart,' the sire of 'Rainbow,' afterwards called 'King George IV.,' sold to Robert Thomas, of Eryholme, Darlington, when seventeen years old, for £300." "'Harpham Twak,' said to be a small horse not more than 15·1, was a full-blood horse, his dam's sire going back to 'The Darley Arabian.'" "'Sawden's Active' was by 'Jalap,' by 'Regulus,' the winner of seven Royal Plates in one year; whilst 'Lamplough's Victory,' from whom a host claim descent, appears by conclusive evidence to have been sired by 'Trotting Jalap,' a son of 'Old Jalap,' which horse is recorded in the *Racing Stud Book* as foaled in 1758. The dam of 'King William' (245), a horse which was in service in 1840, was by 'Brutandorf,' and grandam by 'Old Sandbeck,' were both recorded as full-blood horses, 'Sandbeck' being the sire of 'Barbelle,' the dam of 'Flying Dutchman.'"

The performances of the breed in the old coaching-days are also worthy of notice:—"Of the speed, power, and endurance of these horses, we have recorded that 'Dreadnought,' by 'Old Clothier,' won a trotting match for £100, carrying 16 stones 16 miles within the hour; 'Wonderful,' a horse that obtained a high premium at Ripon Show in 1819, had a brother, 'Peirson's Plato,' that trotted 18 miles within the hour, carrying 18 stones; and Bevas Pullen's 'King William' trotted a mile in three minutes at Selby, carrying 14 stones."

Like all breeds into which foreign blood has recently been introduced, the coaching-horse cannot always be relied upon to breed true to type; but the large proportion of "blood" present in the best specimens minimises this drawback, and time, with the careful breeding now being followed, will efface it entirely.

In meeting driven horses, the following lines indicate the **British rule to be observed in passing**:—

"The rule of the road is as plain as my hand,
To explain it I need not be long:
If you keep to the left, you are sure to be right,
If you keep to the right, you are wrong."

In France and in America, driven horses on meeting pass on the opposite or right side. In this country a vehicle overtaking another goes to the right of the road. An approaching led horse is passed on its left side.

The "**Horse's Prayer**" also appears in verse:—

"Up hill drive me not,
Down hill press me not,
On the level road spare me not,
And in the stable forget me not."

THE AMERICAN TROTTER.[1]

In view of the facts that the greatest progenitors of the breed were of British descent, and that trotting horses have special attractions not only in this country but abroad, no apology is necessary for introducing a brief account of the "National Horse of America" in a book relating to British Live Stock.

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[1] See an article on "The National Horse of America," in the 1887 Report of the U.S. Department of Agriculture, by Leslie E. Macleod, Associate Editor of *Wallace's Monthly*. To this article, and to his friends, the late John Henry Wallace, of Des Moines, Iowa, and his eldest son, Henry C. Wallace, Secretary of Agriculture, Washington, U.S.A., the Author acknowledges indebtedness.

Public interest has been for a good many years divided among the three most noted breeds of trotters—our own Hackney or Norfolk trotter, the American trotter, and the Russian trotter Orlov or Orloff. Of these the American horse is considerably the fastest. The Orlov, founded at Khrenovoya, to the south of Moscow, by Count Alexis Orlov-Tchestmensky, is (if any remain after four years of Bolshevic rule) a multiple cross derived from many breeds—English, Arabian, European, and Persian. The first great sire was an Arab imported from Greece in 1775. By a Danish cart mare he sired "Polkan," who, mated with a strong-built Dutch mare, produced "Barss." "All the Orlov trotters were descended from the three sons of 'Barss'—'Lubeznoy,' 'Dabroy,' and 'Lebed.' They were of no distinct type, but divided into heavy and light trotters. The majority of them showed their vulgar relationships by their large and hairy fetlocks, fiddle heads, and goose rumps. As usual, the cart-horse strain came out in the head, legs, and setting-on of the tail; and the Eastern blood in the body." The best records of the Orlov did not come within the 2:30 record, while the Hackney has been bred more for showy action than for pace. It has been well remarked, in considering the different objects for which trotters are bred, that the aim of the American horse is to create interest by getting as quickly out of sight as possible, while the Hackney strives to attain the same object by keeping within view, and covering as little ground as possible.

John Henry Wallace, above mentioned, the founder and compiler of the *American Trotting Register*, begun about 1865, may be said to have laid the foundations from which the "**Standard Trotter**" has been evolved. The first volume, published in 1868, contained 3000 entries. Wallace laid down the principle that "speed will most probably breed speed," and thus made the test of actual performance the basis upon which animals were admitted to registration in the *American Trotting Register*,[1] which remained his own property till it was sold to a syndicate, along with the *Year Book* and *Wallace's Monthly*, for $130,000. Since Wallace took the matter of registration in hand, the record (per mile in minutes and seconds) has been reduced from 2:19 in 1867 to 1:57¾ in 1921, realising what had for years been confidently expected, *i.e.*, that America would produce a horse that would trot a mile in less than two minutes, or at the rate of over thirty miles an hour. The employment of "pace-makers" and the use of "dirt shields" makes it possible to argue that the unaided horse has not yet reduced the record below two minutes to the mile.

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[1] In 1892 it embraced ten volumes, and registered 60,000 animals.

List of Champion Trotters, showing reduction of the trotting record in minutes and seconds for one mile from 2 : 30 to 1 : 57¾ :—

Oct. 13, 1845	"Lady Suffolk"	2 : 29½
July 2, 1849	"Pelham" .	2 : 28
June 15, 1853	"Highland Maid"	2 : 27
July 14, „	"Tacony" . .	2 : 27
Sept. 2, 1856	"Flora Temple"	2 : 24½
Aug. 9, 1859	„	2 : 23½
„ 9, „	„	2 : 22
Oct. 7, „	„	2 : 21½
Oct. 15, „	„	2 : 19¾
July 30, 1867	"Dexter" . .	2 : 19
Aug. 14, „	„ . . .	2 : 17¼
Sept. 6, 1871	"Goldsmith Maid"	2 : 17
June 9, 1872	„	2 : 16¾
Sept. 17, 1873	"Occident" .	2 : 16¾
July 16, 1874	"Goldsmith Maid"	2 : 16
Aug. 7, „	„	2 : 15½
„ 12, „	„	2 : 14¾
Sept. 2, „	„	2 : 14
Aug. 3, 1878	"Rarus" . .	2 : 13¾
Oct. 25, 1879	"Saint Julien" .	2 : 12¾
Aug. 12, 1880	"Maud S." .	2 : 11¾
„ 12, „	"Saint Julien" .	2 : 11¾
Aug. 27, 1880	"Saint Julien" .	2 : 11¼
Sept. 18, „	"Maud S." .	2 : 10¾
July 13, 1881	„	2 : 10½
Aug. 11, „	„	2 : 10¼
Aug. 1, 1884	"Jay-Eye-See".	2 : 10
Aug. 2, „	"Maud S." .	2 : 09¾
Nov. 11, „	„	2 : 09¼
July 30, 1885	„	2 : 08¾
Oct. 20, 1891	"Sunol" . .	2 : 08¼
Aug. 17, 1892	"Nancy Hanks"	2 : 07¼
Aug. 31, „	„	2 : 05¼
Sept. 28, „	„	2 : 04
Sept. 19, 1894	"Alix" . .	2 : 03¾
Sept. 25, 1900	"The Abbott" .	2 : 03¼
July 26, 1901	"Crescens" .	2 : 02¾
Aug. 2, „	„	2 : 02¼
Aug. 24, 1903	"Lou Dillon" .	2 : 00
Oct. 24, „	„	1 : 58½
Aug. 12, 1910	"Uhlan" . .	1 : 58¾
Oct. 8, 1912	„	1 : 58
Oct. 6, 1921	"Peter Manning"	1 : 57¾

Early distance records, in hours, minutes, and seconds :—

10 miles	Pascal (1893) . . .	0 : 26 : 15
20 miles	Captain M'Gown (1865) . .	0 : 58 : 25
50 miles	Ariel (1846)	3 : 55 : 4½
100 miles	Conqueror (1853) . . .	8 : 56 : 01

The modern improvements in the racing sulky have made the lowering of records in recent times more apparent than real. The "bike" sulky has 4 seconds in the mile to its credit.

The following **rules**, as revised and adopted by the American Trotting Register Association, which came into force on 1st November 1898, explain the meaning of the term "standard trotter" :—

The Trotting Standard.—When an animal meets these requirements and is duly registered it shall be accepted as a standard bred trotter :—

1. The progeny of a registered standard trotting horse and a registered standard trotting mare. 2. A stallion sired by a registered standard trotting horse, provided his dam and grandam were sired by registered standard trotting horses, and he himself has a trotting record of 2 : 30, and is the sire of three trotters with records of 2 : 30, from different mares. 3. A mare whose sire is a registered standard trotting horse, and whose dam and grandam were sired by registered standard trotting horses, provided she herself has a trotting record of 2 : 30, or is the dam of one trotter with a record of 2 : 30. 4. A mare sired by a registered standard trotting horse, provided she is the dam of two trotters with records of 2 : 30. 5. A mare sired by a registered standard trotting horse, provided her first, second, and third dams are each sired by a registered standard trotting horse.

The rack or pacing action,[1] which involves the lifting of the hind and the fore foot on the same side at the same time (giving origin to the name "side-wheeler"), in place of the fore and the hind foot on opposite sides as in trotting, is a natural movement which may appear in the progeny of a noted trotting family in the same way that a famous pacing sire or dam may produce a horse which assumes the trotting rather than the pacing gait. "Probably three-quarters of the pacers are trotting bred."

The pacing standard is the same as the trotting standard detailed above, but pacing horses are entered in a separate section of the "Record." Pacing is kindred to and intermediate between trotting and galloping. The best pacing records are on the whole slightly in advance of the corresponding trotting records, probably because a pacer gets his four feet more nearly in a straight line than a trotter. The pacing movement is increasing in public favour with the great increase of pacing stock.

Important lessons to British breeders are to be learned by studying the early history of the American trotter, which in a word may be said to be descended from the best "clean-bred" English "running" or "race-horse"—the so-called "Thoroughbred,"—with a happy combination of other blood—notably of the old English Trotting horse, the ancestor of the Hackney of the present day. We have the authority of John H. Wallace[2] that two English Thoroughbreds, "Messenger" and "Shark," exported in 1786, laid the foundation of the best blood stock in America. Macleod says:—"The foreign horse that played the most important part in originating the American trotting breed, and that which conspicuously figures in the ancestry of our greatest sires and performers, was 'Imported Messenger.' 'Messenger' was a grey horse, foaled in 1780, bred by John Pratt, of New Market, England, and, according to the English *Stud Book*, was got by 'Mambrino' out of a daughter of 'Turf.' 'Mambrino' was by 'Engineer,' son of 'Sampson,' by 'Blaze,' by 'Childers' ('Flying Childers'), son of the 'Darley Arabian,' a horse imported to England from the Levant in the reign of Queen Anne. 'Turf,' the reputed sire of the dam of 'Messenger,' was by 'Matchem,' son of 'Cade,' by the 'Godolphin Arabian.'"

It is possible that "Messenger" was not a pure Thoroughbred, because his grandsire, "Engineer," sire of "Mambrino," had not a complete pedigree record. There was in this circumstance an opportunity afforded for the introduction of trotting qualities and tendencies from the English trotter of the day, while at the same time the preponderating share of blood was derived from the Thoroughbred connection.

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[1] See Appendix N for illustrations by Eadweard Muybridge on animal locomotion.

[2] In *The Horse of America* (1897), pp. 222-31 and 303, *q.v.*

It is acknowledged by all the best authorities that great uncertainty exists as to the ancestry of many of the **founders of the trotting breed**, but well-authenticated instances of the introduction of Norfolk trotter blood nevertheless exist. "Imported Bellfounder," the sire of the dam of **Rysdyk's "Hambeltonian**," generally conceded to be "the greatest of all American trotting progenitors," is believed to have been of Norfolk blood. "Hambeltonian" was foaled in Orange County, N.Y., in 1849, "and began his career as an obscure cross-roads stud horse," standing at a fee of $35. He and his dam were bought for $125 by Wm. M. Rysdyk, a farm labourer, from his master, Jonas Seeloy, the old Bull's Head cattle drover who hired him. As the horse's own record was probably not more than 3:15, it was not till he was thirteen years of age in 1862 that he began to be noticed as a progenitor of first-class trotters. His stud fee then jumped to $75, $100, $300, and $500 in successive seasons. He ultimately earned $288,000 at the stud. At twenty-five years old he measured 15·0¼ hands at the withers and 15·2¼ at the croup. "He was a long horse, but all his fastest progeny were short in the body." His get was extremely irregular in size, and "unstable in conformation." Many of the best trotters have been about this height—15 to 15·2 hands.

The *New York Herald* recorded that "'Hambeltonian' died in 1876, having begotten about 1333 foals. Forty of them gained trotting records of 2:30 or better; one hundred and fifty of his sons got 1478 trotters of standard speed, and eighty of his daughters produced 110 trotters in the 2:30 list. In the succeeding generations, the achievements of the family are still more remarkable, and it was estimated that nearly, if not quite, 15,000 of the 17,625 trotters in the 2:30 list, when that point was reached, were descended from the 'old hero of Chester,' through either sire or dam, or both. Since 'Dexter's' day, every trotter save one that has lowered the world's record has carried the blood of 'Hambeltonian.' The exception is 'Harus,' 2:13½, whose sire was of unknown breeding. At the close of the campaign of 1901, 138 trotters had earned records of 2:10 or better. Of this number, no less than 135 were traced to 'Hambeltonian.' . . . The most successful horsemen have doubled and redoubled in their studs the blood of the world's famous trotting progenitor, and the greatest of trotters have resulted from this course. 'Crescens' (2:02¼), traces to him through both sire and dam, as did 'Alix' (2:03¾) and 'Nancy Hanks' (2:04)." The course followed was that of "line-breeding," and the wide area of country over which the various members of the great trotting family spread, no doubt tended to minimise any injurious tendencies from consanguineous breeding by change of environment. As his progeny of to-day have not deteriorated in constitution, they have gained immensely in speed. The two stallions mentioned below, "Axtell" and "Allerton," also belong to this line of descent. "Messenger," mainly through "Mambrino," his most famous son, was the fountain-head of the four chief trotting families of the day—(1) the Hambeltonians, (2) the Mambrino Chiefs, (3) the Clays, and (4) the Black Hawks or Morgans. The latter belong to the oldest family of trotters, springing from a horse, "Justin Morgan," foaled in Vermont in 1793. The Morgans produce useful and profitable roadsters, but they are undersized (14·2 to 15 hands), and consequently do not bring the highest prices.

"**Nancy Hanks**" (6), a brown mare bred in 1886 by H. Boswell, Lexington, Ky., first beat the record on a regulation or round track with 2 : 07¼, or 2 : 05¼ on a kite-shaped track, which is considered to be two seconds faster than the other; but as a six-year-old, in the autumn of 1892, she lowered her record to 2 : 04 on a round track, and established her reputation as a "lightning striker." Prior to "Nancy Hanks" **the three most famous trotters** of the day, called the "Trinity of Flyers," were "Axtell" (3) 2 : 12, "Allerton" (5) 2 : 09¼, and "Sunol" 2 : 08¼. "Axtell" and "Allerton" were bred by C. W. Williams, Independence, Iowa. Though "Axtell" possessed the greatest popular reputation, "Allerton" is believed by experts to have been the better horse. "Axtell" was sold to a syndicate in 1889 for $105,000, then the highest price paid for a horse in America. He was retired to the stud, where he was highly successful, and his service fee fixed at the enormous sum of $1000. The mare "Sunol," the property of Robert Bonner, of New York, was bred in California, and sold at three years old for $41,000. "**Dan Patch**" (Plate CXXVI. B), a pacing stallion, 1 : 59¼ at six years old, was with 1 : 56 as his later record, the unbeaten Champion harness horse of the world. He bred by "Kausar," "Joe Patch," 2 : 01¼, the "iron racehorse." "Dan Patch" was sold privately in December 1902 for $60,000. Plates CXXVI. and CXXVII. show that trotting power, in either male or female, is not incompatible with elegance and beauty of symmetry. They also show that in trotting performances of a high order, "blood," or breeding, is sure to come to the front.

"**Uhlan**" (8), 1 : 58, a black gelding by "Bingen," 2 : 06¼, out of "Blondella," by "Sir Walter, jr." (7800), bred by A. H. Parker, Bedford, Mass., passed to Charles W. Sanders, Salem, Mass.; then to C. K. G. Billings, New York; record made at Lexington, Kentucky, 8th October 1912—Driver, Charles Tanner.

"**Peter Manning**" (5), 1 : 57$\frac{3}{4}$, a bay gelding by "Azoff" (2) 2 : 14$\frac{1}{2}$, out of "Glendora G." (3) 2 : 25; bred by W. M. Wright, Chicago, Illinois; now owned by Irwin W. Gleason, Williamsburg, Pennsylvania: record made at Lexington, Kentucky, 6th October 1921—Driver, Thomas Murphy.

"Since 1895, the trotting breed of American carriage-horses has, in competition with the Hackney, dominated the show ring and the sale mart. Every Champion high-stepper of the National Shows since that date has been the offspring of a trotting sire, except in two instances, where the blood of the winners was unknown."

Though the fastest trotters show **breeding** in an unmistakable manner, there are certain peculiarities of form which have become developed in a conspicuous degree—for instance, a massiveness or heaviness about the shoulder, especially round the point, not present in a horse with a running gait. As compared with the running Thoroughbred, the shoulders of the American Standard Match Trotters are more upright, and the width between the forearms greater, giving the appearance of more width of chest. But extra width depends largely on the extra development of the pectoral muscles which lie between the humerus and the chest. To compensate for this peculiarity the fore feet come very closely together through the fore legs being inclined inwards, both at rest and in motion, thus increasing the liability to "hit" or "interfere" while trotting. Boots for the protection of the joints liable to be struck while trotting have to be fixed on the limbs. This danger is aggravated by a comparatively modern development seen in about nine-tenths of the Standard Trotters. Unlike "Hambeltonian," who had straight action, they have their toes turned out. This is supposed to give some advantage while moving at top speed: it seems to be a utility development. The hereditary qualities of persistency at the trot and speed at the trot are well-marked acquired characteristics of the "Standard Trotter." Mares are not usually so well ribbed-up as horses, but the trotter which requires staying power is generally round in the barrel and as well ribbed-up as the chaser. Although "the vast majority of fine hunters and good chasers are considerably higher at the withers than over the croup," the American trotter is generally lower in front than behind. There is in the trotter a great length of hind-quarter from the hock upwards, and the pelvis generally droops posteriorly. As a rule he is good-natured, tractable, and easily trained. His step generally is long and low, qualities which admit of speed, but which do not attract public interest as readily as the high and showy action of the Hackney.

Although it was later than the middle of last century that match trotting really became fashionable in America, the breeding of trotting horses is one of the great live stock industries in the United States. Trotting does not, however, monopolise the racing interest in America. In New York, flat races are more numerous than trotting races, and engage the greatest attention of sporting men. Towards the West the interest in trotting increases, and in Kentucky it is all-absorbing.

N.B.—See *The Trotting and the Pacing Horse in America* by Hamilton Busbey. (London, Macmillan & Co., 1904.)

CHAPTER XXIII

LIGHT HORSES (*continued*)

Irish Horses—The Hobby—The Thoroughbred—The Irish Draft Horse—The Hunter—The Connemara Pony—Schemes for the Improvement of Horse-Breeding in Ireland—The Polo Pony Society—The Polo Pony *Stud Book*—Inclusion of Indigenous **Mountain Ponies**—Methods of Improvement—North Wales Breed—South Wales Breed—New Forest Ponies—Dartmoor Breed—The Highland Ponies of Scotland—Western Islands Riding Ponies—The Highland Garrons—The Shetland Pony—**The Ass—The Mule** and **the Zebrule.**

IRISH HORSES.

IRELAND has long been noted for the production of **light horses**. The Irish hunter enjoys international celebrity, and the Army authorities of Great Britain, as well as of a number of continental countries, regularly resort to Ireland for some of their best chargers and troop horses.

Though such information on the point as is available is largely traditional, it is now generally recognised that the foundation of the Irish light horse of the present day was **the Hobby**—a type of horse which became established in the country in the sixteenth century. In those days the area of land under cultivation in Ireland was limited, and the care of the flocks and herds, in which the country abounded, necessitated the use of a smart, active horse, which was evolved by crossing the native stock with sires imported from Spain, between which country and Ireland there was at the time considerable commercial intercourse. Horses of this type were exported to Great Britain and the Continent, where their stamina and "mettle" earned for them high repute as saddle and pack animals. Discussing the horses of that period, a correspondent of a Live Stock Journal wrote some years ago:—

"Nothing struck the early invaders of Ireland more than the contrast between their own great heavy horses—probably Flemish—and the smaller and more 'classy' steeds of the natives, that in all probability owed their origin to the constant traffic between Galway, Limerick, and other parts, with the Gironde and Spain, the countries of the Barb. Giraldus Cambrensis extolled the 'hobbies.' Stanyhurst said: 'The nag or the hackine is very good for travelling, albeit others report to the contrary, and if he be broken accordinglie you shall have a little Tit that will travell a whole daie with anie bait.' Theiner, reporting to the Pope, said: 'The land produces absolutely nothing but oats, and most excellent victorious horses, more swift than the English horses.' Arabian and Turkish horses were imported in the time of the Stuarts; some of them found their way into Ireland. But the half-bred or seven-eighths hunter is the speciality of Ireland, and has been for many years a valuable export; and Ireland still remains the best mart of the world for war horses and hunters."

The following is a quaint though instructive description of a **Medieval Irish Horse** and his rider:—"The blue-eyed hero [Murough] dressed himself in his armour and arms of valour, his broad full-form mail coat, his long venom-edged blade, his champion's helmet full of starry carbuncle stones, his two thick-hafted battle-javelins in his firm unlooseable hands, his empurpled brown-red shield upon the arched-expanse of his back, a sharp knife-dagger on his left side, and three letters, of golden letters, written on the shield and the knife, setting forth that it was he himself who used to lop the heroes in the battle. Then there was found for him a smooth, high-spirited, very-fast, clear-leaping steed, with four shoes of fine-white silver beneath him and a golden-bitted bridle, which [steed] had in itself twelve accomplishments of excellence: first, three excellences of a woman—a narrow waist, a full hip, and a proud spirit; three excellences from a bull—a stout eye, a thick neck, and a broad face; three excellences from a fox—a bounding gait, a pointed ear, and a bushy tail; three excellences from a hare—a high leap, a rapid turning, and a run uphill. Then he got on the back of his blue, sweeping, very-knowing, lively, expert steed so that they went in no other fashion than as it were a *lon*[1] going before the wind, or a seamew off a bald mountain head, or a wheel down a great incline, or a sound going through the valleys, or Ceadach, the son of the King of Sorcha, going to dispute with the king-son Caoilte mac Ronain in the desert places of Airreacht O'Conor, on the near confines of Erin and Alba; so that such was the career of travel and constant-going which the hero made at that time, that he would rout badger out of woods, geilts of glens, wolves under heights, and put foxes a-wandering, ever, until he came to the brink of Loch Derg."—*The Lad of the Ferule*, with translation, notes, and glossary by Douglas Hyde (London: Irish Text Society, 1899), pp. 31-32.

About the beginning of the eighteenth century a number of stallions of Eastern blood were introduced from England and these, mated with native mares, produced what is considered to be the parent stock of the present-day **Thoroughbred in Ireland**, the breeding of which may be said to date from this period. In the eighteenth century racing became general in Ireland, and gave a great stimulus to the breeding of Thoroughbred horses in the country. Valuable stallions were imported from England, and towards the middle of the century there were upwards of a hundred imported Thoroughbred sires serving in the country. From this time the history of the Thoroughbred horse in England and in Ireland is practically identical.

The first authentic reference to the **Irish draft horse** dates from the close of the eighteenth century. At that time a great increase in the area of land under tillage took place, and this created a demand for a bigger, stronger, and more docile horse than was required when the land was chiefly devoted to the rearing of flocks and herds. Draft horses were imported from England to meet this demand, but these horses failed to serve the purpose for which they were intended. The cross of the heavy cart horse with the Irish mare was found unsuitable, and the effort to effect improvement in this way was eventually abandoned. The people were therefore compelled to rely on the selection of the heavier of their native horses for the production of animals of a type suited for farm work. The animal produced to meet this demand must have been a farm horse of good quality, for he filled that position when Ireland was largely engaged in tillage; he was also a roadster of sufficient merit to suit the requirements of a farming population; and though too coarse for hunting he had a natural liking for the sport, as shown by his high spirit and the readiness with which he took to jumping.

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[1] Norwegian, *Lom*; English, *Loon* = a Diver (*Colymbus*).

In 1917 the Department of Agriculture and Technical Instruction for Ireland commenced the publication of a *Stud Book* for horses of the Irish draft type. Entry to this book—which is open to mares as well as to stallions—is conditional upon the animals passing a special inspection, which is conducted by experts appointed for the purpose by the Department. Out of 1180 mares and 270 stallions inspected, there were selected as eligible for entry in the first volume 375 mares and 44 stallions; while, according to the fifth volume published in January 1921, the numbers of animals now registered as of the approved Irish draft type are 775 mares and 74 stallions. Keen interest is being taken in this scheme, and it is confidently expected that in due course it will lead to the establishment of a distinctive breed of Irish draft horses.

One of the most valuable characteristics of the old Irish draft horse was its suitability for mating with the Thoroughbred. To this cross Ireland owes **the hunter**, which has established for the country a world-wide reputation. A very large proportion of the best Irish hunters are bred by crossing clean-legged and well-knit but "roomy" farm mares with Thoroughbred sires, though many good hunters also result from a cross of these mares with sires of the hunter type. The latter are for the most part the progeny of Thoroughbred sires, and though commonly described as half-breds, they are often three parts bred. As the writer of an article on "The Horse in Ireland," in the *Journal of the Department of Agriculture and Technical Instruction for Ireland* (October 1904) puts it, "the typical Irish light horse is of good size; his bone is specially well developed; his legs are clean, flat, and hard, without spongy softness of bone or ligament, and the hair is fine and sparse all over the body though somewhat coarser on the back of the fetlocks."

One of the few areas in Ireland which for a considerable period escaped the infusion of the fresh blood which was introduced from time to time with a view to imparting more size to the native horses was the western sea-board of County Galway, known as Connemara. In that district there has been evolved a hardy race of small horses to which the name of "**Connemara pony**" is commonly, though not correctly, applied, since the animals are essentially of the small horse rather than of the pony type. These Connemara "ponies" though dwarfed by the climatic conditions of an exposed sea-board as well as by the meagre fare afforded by the moorland wastes of their native home, still retain the high courage and stamina of their ancestors, and, though somewhat modified in shape, they possess the strength and bone so characteristic of the light horse of the country generally.

Some thirty years ago an effort to improve these Connemara horses was made by the Irish Congested Districts Board, which for the purpose introduced sires of a number of breeds, including the Hackney, the Welsh cob, and the Norwegian pony, but for various reasons the experiment was not a success. The services of the sires employed under this scheme have been discontinued for a number of years, and at present there is hardly a trace of their influence left in the districts in which they were used. Such improvement as is now in progress is being carried on by private enterprise and chiefly by selections of sires from within rather than by the introduction of sires from outside sources.

Within the past thirty years much has been done by the State to encourage **improvement in the breeding of horses in Ireland**. In the year 1887 the Imperial Government made a grant of £5000 per annum for the "Improvement of Irish live stock," and the administration of this fund was entrusted to the Royal Dublin Society, who allocated £3200 each year to the advancement of horse-breeding. So far as it applied to horses, the grant in question was expended by the Society in the form of premiums to stallions which were distributed throughout the country in accordance with local requirements. This system was continued up to the year 1891, when the payment of premiums was discontinued and the money devoted to the provision of free or partly free nominations to mares. In conjunction with this mare nomination scheme a Register of Thoroughbred stallions, passed as sound and suitable for stud purposes, was issued annually by the Society. The numbers of stallions so registered during the period in which the Society was entrusted with the administration of the grant, were as under:—

Year	1892	1893	1894	1895	1896	1897	1898	1899	1900
Horses	101	119	105	219	239	212	217	206	120

On its establishment in 1900, the Department of Agriculture and Technical Instruction for Ireland became responsible for the improvement of horse-breeding in the country; and with the more ample funds at its disposal, it was in a position to undertake the work on a wider scale than was possible for the Royal Dublin Society with its comparatively limited resources. In consultation with a committee of experts representing the various horse-breeding interests of the country, the Department decided to proceed on the principle of keeping the breeding of certain types of horses distinct, the object being to prevent as far as possible the mixture of breeds whose crossing tended to degeneracy rather than improvement. In pursuance of this policy the registration of sires of the Shire and Clydesdale breeds was confined to prescribed area, while the Thoroughbred and the Irish draft horse were recognised for service throughout the country as a whole. This policy is being continued to the present day.

Under the Horse Improvement Scheme at present in operation in Ireland, Local Authorities, known as County Committees of Agriculture, make provision for the award of free or partly free nominations to approved mares, for service by sires registered by the Department of Agriculture. The selection of the mares to which these nominations are awarded, is made by judges appointed by the Department, and the cost of the scheme is borne jointly by the Department and by contributions from local rates. The numbers of mares to which nominations were awarded, and the total amounts expended on nominations during the years 1915-1919, were as under:—

Year.	No. of Mares Selected.	Amount Expended on Nominations.
1915 . .	5956	£11,994
1916 . .	5601	11,143
1917 . .	5533	10,830
1918 . .	5473	10,542
1919 . .	5488	10,506

During the same period the numbers of sires approved for the service of nominated mares and accepted for entry in a Register of stallions, which is published each year by the Department, were:—In 1915, 438; in 1916, 485; in 1917, 525; in 1918, 484; in 1919, 470.[1]

The **Polo Pony Society** was initiated under the presidency of the Earl of Harrington, at the Chester Royal Show in June 1893. The *Polo Pony Stud Book*, "for the improvement and encouragement of the breeding of high-class Riding Ponies," is the chief instrument through which the Society exercises its useful influence.

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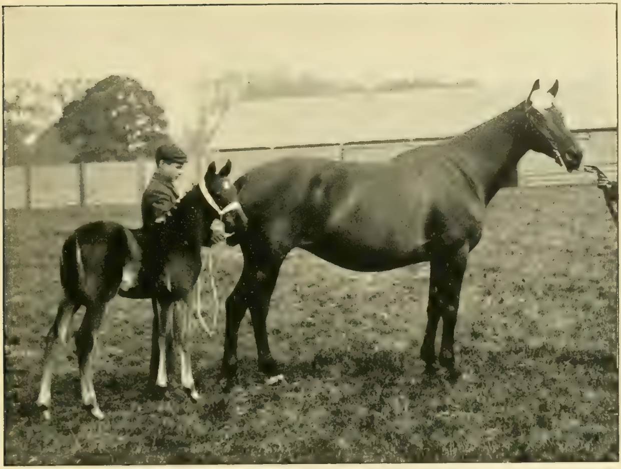
[1] For bringing the foregoing part of Chapter XXIII. up to date, indebtedness is acknowledged to A. Gallagher of the Department of Agriculture for Ireland.

The **members of Council** were:—E. M. Archdale, Crock-na-crieve, Ballinamallard; Sir Douglas Brooke, Bart., Colebrook, Brookboro'; Captain Moray Brown, 36 Woodstock Road, Bedford Park, London; Lord Arthur Cecil, Orchardmains, Tonbridge, Kent; W. Scarth Dixon, 56B Micklegate, York; Stuart Foster, Postlip Hall, Winchcombe, Gloucestershire; A. E. Gerard, Hopesay, Ashton-on-Clun, Salop; the Earl of Harrington, Elvaston Castle, near Derby; Captain Herbert, 57A Pall Mall, London; John Hill, Felhampton Court, Church Stretton; Lt.-Col. C. Campbell Hyslop, Stretton House, Church Stretton; E. Langford, Chirbury Hall, Chirbury, Salop; Marquis of Londonderry, Londonderry House, Park Lane, London; J. W. Macfie, Rowton Hall, Chester; F. B. Mildmay, M.P., Flete, Ivybridge, S. Devon; W. L. Pilkington, Huyton Grange, Liverpool; Sir Walter Smythe, Hurlingham Club, Fulham, S.W.; Sir Humphrey de Trafford, Bart., Trafford Park, Lancashire; the Rev. F. F. Vidal, Arab Stud Farm, Needham Market; J. R. Walker, The Knowl, Burton-under-Needwood; John Williams, Bala, North Wales; Owen Williams, Cefn, St Asaph; C. Woosnam, Cefnllysgwynne, Builth; Frederick Wrench (*Vice-President*), Irish Land Commission, Dublin.

The Council and certain others were elected to act as judges of the eligibility of ponies for entry. In 1889 the judges on this Board of Inspection numbered 100. Its members lived widely apart—in England, Wales, and Ireland, but none were resident in Scotland. The limit of height of foundation mares and stallions was fixed at 14·2 hands, and no such animals could be entered without certificates signed by judges, unless they were certified leading prize-winners. The certificates include freedom from hereditary disease.

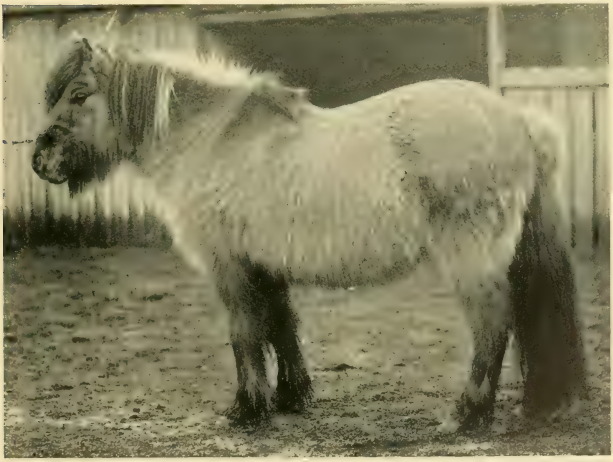
The **height** of the polo pony has been a subject of considerable discussion during the last few years. Many good ponies were just a trifle over the 14·2 hands, a natural consequence of continued breeding on the lines laid down, especially where there was a good deal of Thoroughbred blood. A few years ago the Americans began to play much taller ponies and English teams were considerably handicapped when they met them. Much thought was given to the subject, and finally it was agreed that a stallion should be admitted to the *Stud Book* provided he did not exceed 15 hands, and a mare provided she did not exceed 14 hands 3 in. The height of playing ponies according to the Hurlingham rules remains 14 hands 2 in.

The late **Captain Moray-Brown's description of a Polo Pony** is taken as a *standard* to aim at in the shape and quality



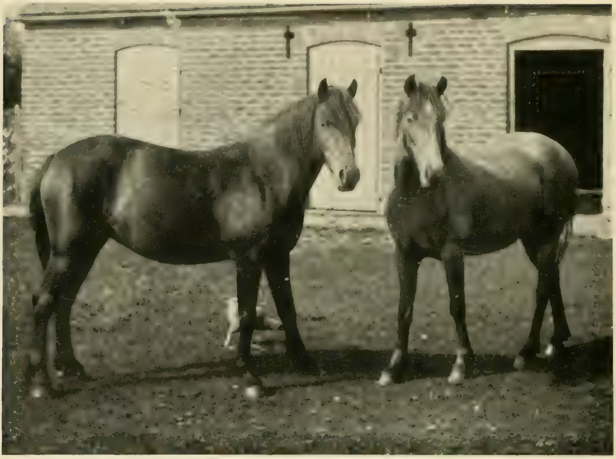
A. Polo Pony Mare, "The Pheasant," and Foal by "Rupert."
Winner of Gold Medal at B. and W. Show, 1905. Owned by the late Miss Standish,
Marwell Manor, Eastleigh, Hants.

[*G. H. Parsons, Alsager, Cheshire.*



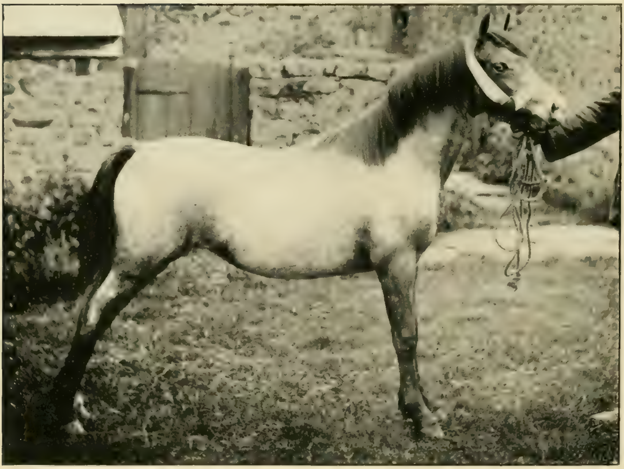
B. The Celtic Pony.
With three kinds of hair on the tail, and no callosities on the hind legs.
Recognised as a distinct type of horse by Professor Cossar Ewart, Edinburgh University.

[*C. Reid, Wishaw.*

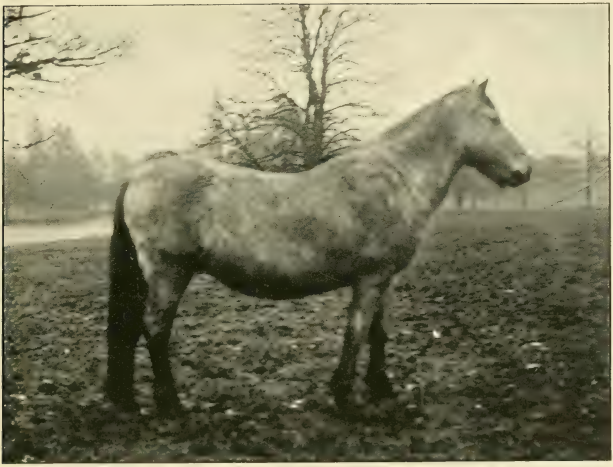


A. Welsh Mountain Pony Mare and Filly.
Owned by W. Y. Craig, Milton House, Alsager.

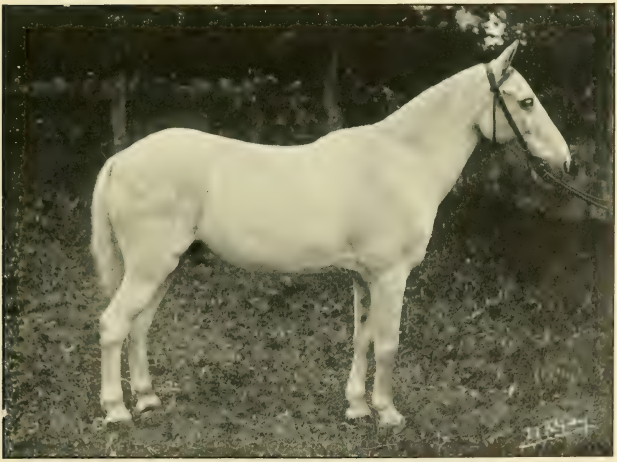
[*G. H. Parsons, Alsager, Cheshire.*



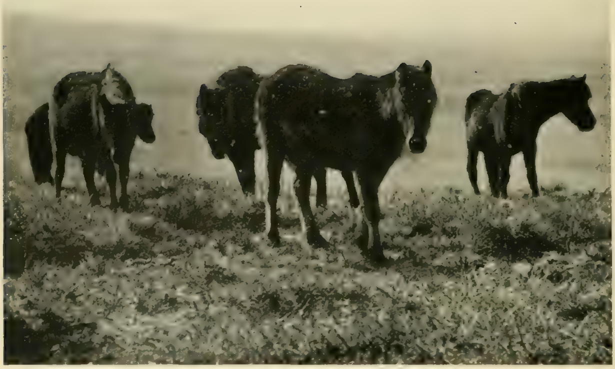
B. Welsh Pony, "Searchlight."
Owned by D. Price, Queen's Square, Llangadock, Carmarthenshire.



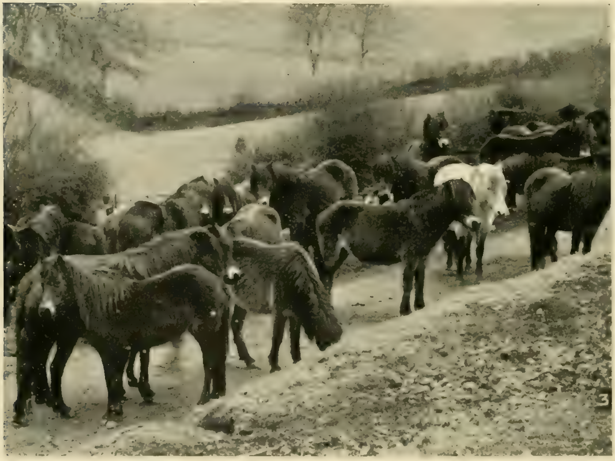
A. Welsh Pony, "Old Stager" (362), in Winter Coat. Foaled in 1865.
Produced thirty-five living foals, the last in 1904. Lived in the mountains till spring 1905.



B. Dartmoor Stallion, "Tommy," at 32 years, 11 h.h.
Owned and photographed by N. R. Gay. Moorland Park, South Brent, Devon.

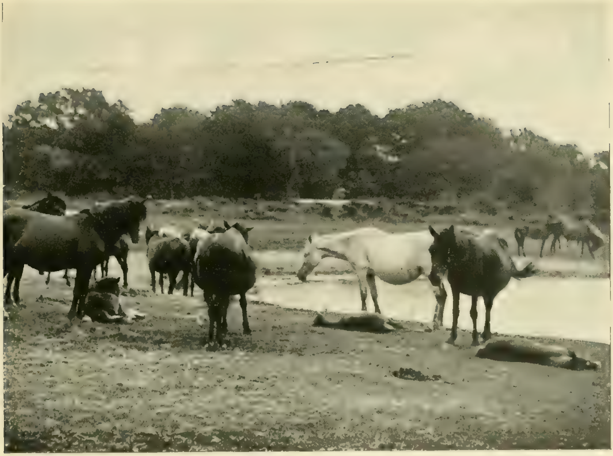


A. Dartmoor Ponies in their Home Quarters.



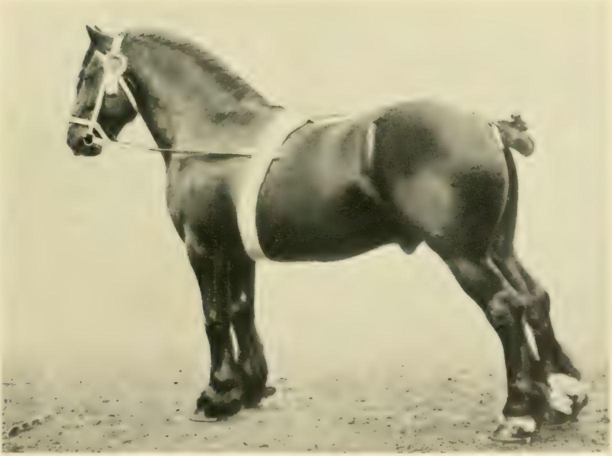
B. Exmoor Ponies brought down from the Mountains.

[*Both by C. Reid, Wishaw.*



A. NEW FOREST PONIES.

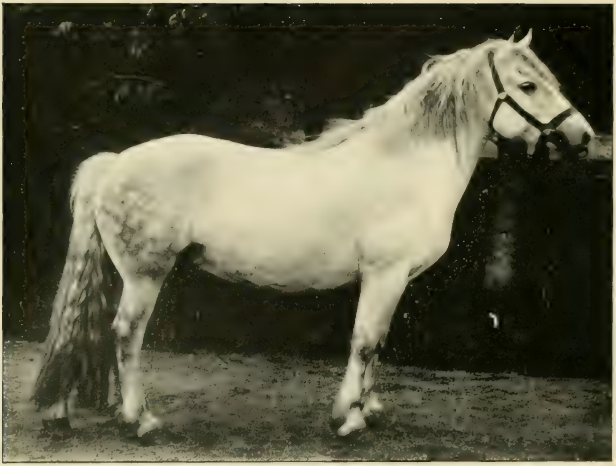
[*C. Reid, Wishaw.*



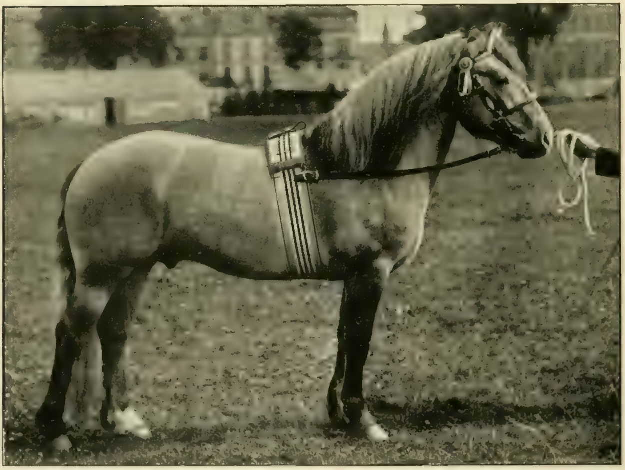
B. DALES PONY STALLION "LINNEL COMET."

Won at the Darlington Royal in 1920, also the Cup in London in 1922, for Mountain or Moorland Pony Stallions, and Five Ministry of Agriculture Premiums—1918, 1919, 1920, 1921, and 1922. Owned by Roy B. Charlton, Linnels, Hexham.

[*W. W. Rough & Co.*

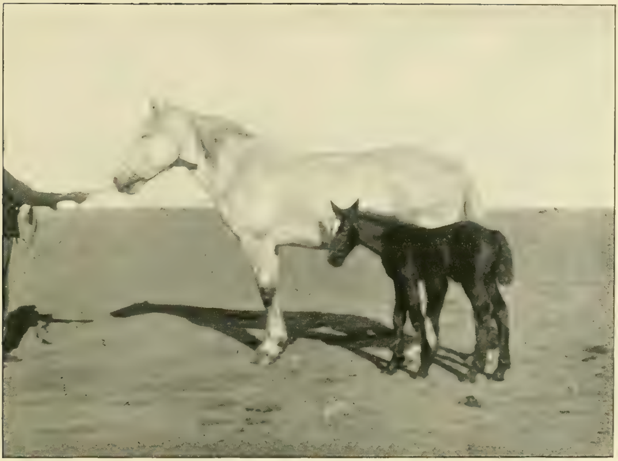


A. HIGHLAND GARRON MARE.

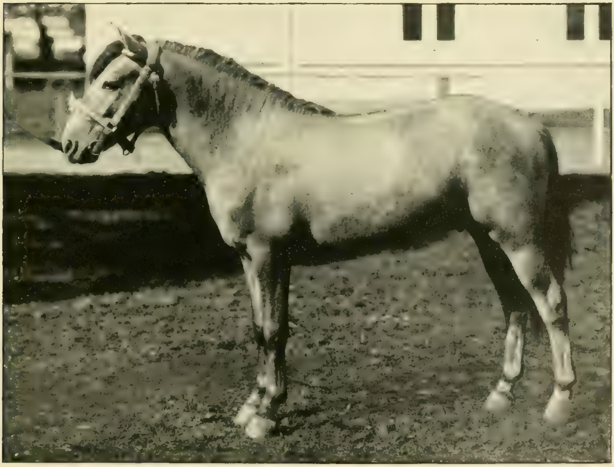


B. HIGHLAND GARRON STALLION, "BONNIE LADDIE."
Breed Champion at Perth Highland Show, 1904; and Special Prize, Polo Pony Society, for Best Male; also the President's Medal for Best Male, Glasgow, 1905.

[*C. Reid, Wishaw.*

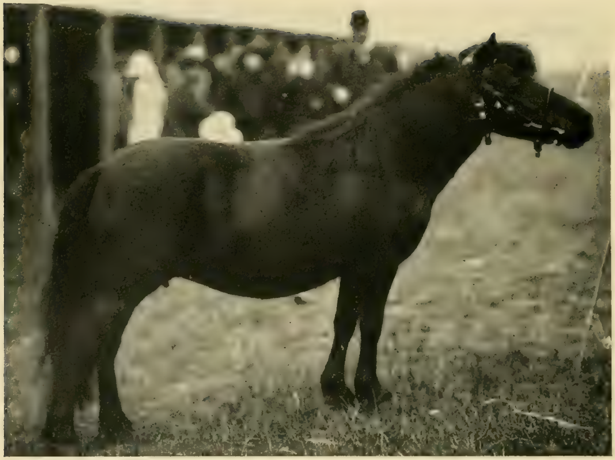


A. PERCHERON MARE WITH A BLACK FOAL,
which, like the black foal of the Garron, becomes white with years.

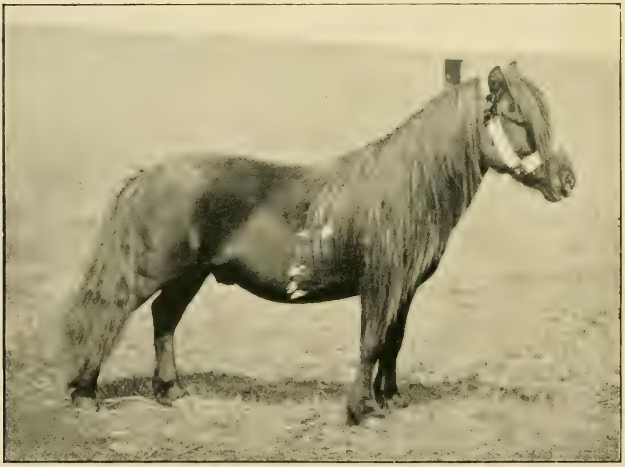


B. PERCHERON-SHETLAND FIRST CROSS at 2 years old.

[*From the Author's "Argentine Shows and Live Stock,"* 1904.



A. SHETLAND MARE, "BRIGHT BLOSSOM," 10 years 2 months old.
President's Champion Medal at Highland Show, 1920.
[*"Agricultural Gazette Photograph."*



B. SHETLAND PONY STALLION, "LAIRD OF NOSS" (20).
First at the Highland Show at Inverness, 1892.
Then the property of the Marquis of Londonderry, Seaham Hall, Seaham Harbour.
[*C. Reid, Wishaw.*

of a high-class riding pony. "He or she should have a clean, well-bred head, a broad forehead and intelligent eye, a well set-on neck, strong, flat legs, and good sound feet. The nearer perfection you can get shoulders the better, for, though sloping shoulders are not absolutely necessary for turning quickly or for speed, yet good shoulders will often enable your pony to recover himself if he makes a mistake or gets knocked out of his stride. The pony's back should be short and muscular; the ribs well arched, and the loins strong; the quarters should be long, strong, and muscular, with length from hip to hock, and the second thighs well developed. Do not despise a pony with a tendency to sickle hocks or with a slight goose-rump. These points may offend the eye as far as symmetry is concerned, but an animal thus made, though he may lose speed from the conformation, can invariably turn quickly. Let your pony show as much substance as a weight-carrying hunter, the quality of a racehorse, and measure from 14 to 14 hands 2 in." To stand with the hind legs well under the body like a zebra, enables a polo pony to turn more cleverly in the game than when the legs are placed perpendicularly, as they ought to be in the case of other horses.

The *Polo Pony Stud Book* differs from other British Stud Books in admitting specimens of any breed that do not exceed 14·2 hands, and that pass the rigid inspection of the judges. Small-sized thoroughbreds, such as "Rosewater," who gained first in a strong polo class at Hurlingham; "Dancing Girl" by "Starlight" out of "Pretty Dance"; and "Tessie"—a Newmarket as well as a pony race winner—are eligible, and supply an important element in the foundation being laid of the riding pony of the future. No distinct type of riding pony exists, and the individual specimens of "weight-carrying" ponies are rare and valuable, and much in demand. Although many others are admitted to the Register, "the weight-carrying blood polo pony is the type which the Society considers is the one to be aimed at."

Ponies are more and more wanted as hacks, apart from the insatiable demand for high-class polo types. Built on proper lines, a riding pony should trot, canter, or gallop, but the high-trotting harness action is an objection, as it implies discomfort to the rider and an unnecessary test of endurance in the animal's fore feet. Welsh ponies in some districts have been spoiled for the saddle by crossing with the Hackney to gain size, but the *pure-bred Welsh pony* is regarded, in relation to the objects of the Polo Pony Society, as one of the safest and most appropriate foundation breeds to incorporate. "The indomitable pluck, endurance, and good temper of the Welsh pony, together with his substance and dash, will be found an invaluable cross for the thoroughbred and Eastern bred ponies."

A great difficulty in breeding polo ponies has been to keep the height within the limit; and small, pure pony blood as female foundation stock becomes invaluable. With the Welsh should be mentioned the Dartmoor, Exmoor, New Forest, Church Stretton Hills, and West Highland ponies, the characteristic features of which are discussed later. The general run of these animals have been so left to Nature and neglected, that they would not pass the entry inspection, but their hardiness of constitution and other qualities cannot be ignored; and by allowing only the best stallions selected at the annual "round ups" to breed, the herds running wild may be improved so as to produce many useful breeding mares to be taken into the *Stud Book*.

Vol. V. contains the following defence of the inclusion of the word "Polo" in the name of the Society—**Polo** being only one of the many uses to which a riding pony under 14·2 hands can be put. "The pony suitable for polo must be the highest type of a riding pony, with well-laid, powerful riding shoulders and good forehand generally, while the necessary power across the loins and muscular hind-quarters, with clean strong hocks, will not be forgotten. They have to carry at top speed weights which are generally considered ample for hunters of 15·2 and upwards, and are therefore *a first-class pony* for riding purposes."

The **admission** of the various indigenous **mountain breeds** for registration in the *Polo Pony Stud Book*, each in its own division, was announced in the same volume with the stated object that "by registering such of them as are likely to breed riding ponies, and by periodically going back to this fountain-head of all ponies, we may be able to regulate the size of our high-class riding ponies to the desired limit, while at the same time we shall infuse into their blood the hardiness of constitution and endurance, combined with a fiery yet even temper, so pre-eminently characteristic of the British native breeds."

Lord Arthur Cecil, who wrote the introductory statement to the 1899 volume, says:—

> "Personally I am of opinion that the one great recommendation should be the power of the animal to live and thrive in the winter time without any adventitious sustenance, while there are many characteristics which all these possess in common, notably the clean-cut head, small ears, bright, full eye, and well-curved nostrils, together with a strong predisposition to the brown colour, with light tan or mealy points, which we see running through them as a common attribute of them all."

In addition to giving a preference to the best stallions within each breed by castrating inferior ones, **two methods of**

improvement are suggested. One is "a free interchange of stallions of any of these breeds."

With that method we heartily agree, if an exception be made of the Highland Garron, which is unlike the others; but with the suggested introduction of Arab or English thoroughbreds into the herds of mountain ponies, where they have "to live and thrive in the winter-time without any adventitious sustenance," we cannot concur, because it can only end in disaster and tend to the depletion, not to the strengthening, of that "fountain-head of all ponies," which is a product of Nature's inexorable law of the survival of the fittest. If the riding pony of civilisation is, as is asserted, going to gain hardiness and constitution by the introduction of blood from the mountain "fountain-head," so as surely will the Highland "Shelty" lose that hardiness and constitution which is essential for its very existence, by the introduction of such alien blood. No better animal than a properly selected thoroughbred could be found to introduce quality into a breed of ponies that are independent of the climate and of Nature's scanty rations; and for certain purposes the Arab may be included. The reports that Arab blood was introduced into the Connemara breed, and into that of the West Coast of Scotland, by "shipwrecked remnants of the cavalry" from the Spanish Armada, are vague traditions. If the tales were true, there is a strong presumption that the imported horse of these early days would be a hardier animal than his modern successor.

Mountain and Moorland Breeds of Ponies.

The "Dales" and "Fell" breeds of ponies are believed to have had a common ancestry in the now extinct Scottish Galloway from the wilder parts of Kirkcudbright and Wigtownshire. The "Fells" average 13·1 hands and the "Dales" 13·3, and are typical products of the influence of their natural surroundings and the work required of them during a prolonged period of years.

Fell ponies run in droves summer and winter on the bleak Fells of Cumberland and Westmorland. A mare with foal at foot may be seen with her progeny a year old and two years old keeping company till the "stag" at two and a half years goes off to Brough Hill Fair or other local market, and is haltered for the first time after being sold. The Fell pony is hereditarily extremely hardy, as only the toughest survive the wretched poverty of spring which stunts their growth and reduces their numbers.

The Dales pony as compared with the Fell pony is highly favoured in its surroundings. The mares kept in limited numbers, singly, by small Dale farmers, are the only equines required to do all kinds of work and breed regularly as well. The foals are neither pampered by overfeeding nor starved, but, after being weaned in autumn, being supplied with a little hay during snow-storms, they develop by sale time, when two and a half years old, into stronger and better animals than the Fell ponies. (See Appendix H 1.)

The habitat of the Dales pony is the upper Dales of Tyne, Allen, Wear, and Tees, descending from Killhope Hill, 2200 feet high, for many years a prominent centre of the lead mining industry of the Pennine Hills, which was largely responsible for the development of the utility qualities and substance of the breed. Great numbers of pack ponies were employed to carry the ore from the mines down the rough tracks to the washing centres in the dales, and from these to Newcastle and other East Coast seaports. "These weight-carrying ponies, bred for generations for the purpose, were famous for their great strength, hardiness, sure-footedness, and activity, and for their ability to get over the ground quickly. They were great walkers and very fast trotters, but were never trained to gallop. Almost without exception the old Dales pony Stud-cards boast of trotting records, naming times of about three minutes to the mile, and often with up to 12 stones on their back. The present-day Dales ponies are of a most powerful and cobby build, retaining many of the above-named characteristics; but having in latter years been bred with more harness work in view, their free shoulder action has deteriorated, and they are now what might be termed "heavier in hand" than were the original "pack" ponies.[1]

The best specimens, with perfect feet and legs, and a lot of fine hair on their heels, stand up to 14·2 hands in height; and average 14-hand mares have 8½ in. of bone below the knee; the action is free and straight, but not infrequently too wide behind; the heads are neat and pony-like, with prick ears and characteristic eyes and nostrils, clean throats and fine jaws, and necks inclined to be too short; shoulders strong but too steep and upright. To undo this defect and secure a greater length of shoulder-blade is one of the aims of the Dales Pony Improvement Society, which published its First

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[1] *The National Pony Stud Book*, vol. xv. (p. 45), which includes for the first time "Dale Ponies" and "Riding Cob Mares" (p. 46). The latter "must be of Riding type, with length and great substance," a head "suggestive of pony blood"; well laid shoulders; deep through the heart; short back; strong loins and powerful quarters; bones flat and ample, short below the knees and hocks; hard, sound, and open feet; "free and level action, and good but not extravagant use of knees and hocks in the trot, and with easy canter."

Annual Report in December 1917. Backs, loins, and hindquarters are excellent, associated with well-sprung ribs, great muscle and strength, and well set-on tails. Dale ponies carry their heads in the right positions. The animals have wonderful constitutions, and they are acknowledged to be quite free from hereditary unsoundness. "They are good-tempered, easily broken, and never sulk; and generally do all the work of the small farms of the dales," including "taking the family to market, and occasionally giving their owner an enjoyable day's hunting." The prevailing colours are jet black, brown, and bay, and occasionally grey; but chestnut and broken colours are never seen in the pure-bred Dales pony.

It is anticipated that "when type and breed are well revived, owners of pedigree ponies can look in the Dales of Northumberland and Durham for crossing to give 'carriage' and shorter backs to the Highland pony; to give bone and strength to the New Forest and Dartmoor ponies, which have been fined down to blood weeds by the thoroughbred and Arab crosses; and to the Welsh pony, which also wants a dash of some other real pony if it is to maintain its utility. The outside world also wants Dales ponies to cross with Clydesdales and produce the ideal 'Gunner,' or to cross with the thoroughbred to produce officers' mounts. All of the latter crosses were well known in France to be able to 'kill' any of their neighbours of other breeds."

New Forest Breed.—"For the New Forest pony it is difficult to give any exact description, but the best class of them are from 12·2 to 13·2 high, according to the portion of the Forest in which they are reared. If taken off the Forest when they are weaned, and well kept during the first two winters, they are said very often to attain the size of 14·1. There is sometimes an apparent deficiency of bone, but what there is should be of the very best quality. The feet are wide and well formed. They are often considered goose-rumped, but their hocks should be all that could be desired. In colour they may be said to range through every variety, though there are not many duns, and few, if any, piebalds left. The flea-bitten greys, which are still very common in the Forest, show strong traces of an Arab cross. The shoulders, though not always what might be desired in point of depth, are almost invariably fine and well laid. It is a great characteristic of the New Forest pony to be always gay and alert, and, though they are extremely good-tempered and docile when fairly broken, they are quite indomitable until they are completely cornered. The true Forester is never sulky."

The following **characteristics of the various mountain and moorland ponies** are mainly extracted from the authoritative statements in Vols. V., VII., and XV. of *The National Pony Stud Book*, and should be read along with the general descriptions already given at page 512 :—

North Wales Breed.—"The height should not exceed 12·2 hands. Bay or brown is preferred; grey or black allowed; but dun, chestnut, or broken colour is objectionable. The action should be that of a hunter; low [action], 'daisy-cutting' to be avoided. A pony should move quickly and actively, stepping out well from the shoulder, at the same time flexing the hocks, and bringing the hind legs well under the body when going. It should show good 'pony' character, with *unmistakable evidence* of the hardiness peculiar to mountain ponies, and at the same time have a lively appearance. The shoulder should be well laid back and sloping, but not too fine at the withers, nor loaded at the points."

South Wales Breed.—"The South Wales hill pony seldom exceeds 13 hands, and in a pure state is about 12 hands. His attributes are a quick, straight action and sure-footedness; he is low in the withers, short in his forehand, and, though with faulty hind-quarters, as far as appearance goes, his tail being set-on low and his hocks sickled, his fore legs and feet are good. His head and eye show breed, courage, and sense, and his constitution is strong, or he could not live where he does. Of late years he has been crossed with the Cardiganshire cob to some extent; and half-bred two-year-old Shire colts have been allowed access to the hills in the summer in some places, much to the detriment of the breed. In colour, bays and browns prevail."

Dartmoor Breed.—The height does not exceed 14 hands for stallions, and 13·2 for mares. Pure specimens free from Hackney blood are not over 13 hands, and are rarely over 12·2. Black, brown, or bay is preferred; roan and dun are very rare; grey and chestnut result from crossing. The head should be small, well set-on, and blood-like; the ears small and sharp at the points; the neck not too heavy, but strong, graceful, and of good length; the chest well let down, and the fore legs short with a good amount of extremely hard bone of the finest quality.

"The feet are almost invariably excellent, but, owing to many ponies never being shod till they are four or five years old, the walls of the hoofs sometimes break away when the shoes are first put on. The backs of the stallions are rather shorter than those of the mares, but the loins are powerful and the middle well ribbed up. As in the case of most horses and ponies which have been bred out in the open for generations, there is an unfortunate tendency towards a droop of the quarters. It must be further admitted that some are more or less cow-hocked. In all probability both these defects are due to the life of hardship the ponies lead on the moor, as in heavy weather they huddle together and turn their hind-quarters to the bitter winds, thereby affecting, in the course of time, the carriage of their hocks and hind-quarters. Yet it is not every Dartmoor pony that is goose-rumped or cow-hocked, and even when he is so afflicted, he still remains one of the very best ponies for work, and absolutely the hardiest (*sic*) constitutioned horse in the world. That the tendency to plainness is capable of modification there can be no doubt, and probably the best of all bloods to introduce for the purpose is that of the Exmoor, provided the stallion selected is a pure-bred moor pony, and not some fantastic cross, of which there have been far too many in North as in South Devon. The wild Dartmoor hills would lose a great deal of their charm were they not dotted with stray studs of these pretty little creatures, which in summer lead an ideal life of pleasure and freedom. Even in winter, when the mountains are enveloped in snow they appear to enjoy life thoroughly. Often may one observe a sturdy old mare go to a furze-bush covered with snow, beat it with her foot, and after bruising the bush, eat with apparently as much relish as she would a bundle of the best upland hay. A great place for the sale of the Dartmoor pony is Brent Fair, held at a convenient spot on the southern edge of Dartmoor."—J. B. T. KINGWELL.

Exmoor Breed.—"The Exmoor pony should average 12 hands, and never be above 13 hands; moorland bred; generally dark bay or dark brown, with black points; wide forehead and nostrils; mealy nose; sharp ears; good shoulders and back; short legs, with good bone and fair action."

The Highland Ponies of Scotland were admitted as a separate breed in Vol. VII. of the *Stud Book*, 1903. J. H. Munro Mackenzie, Calgary, Isle of Mull, divides the breed into three classes:

(1) *The representative of the original Highland Pony* (12·2 to 13·2) of *Barra and the outer Islands.* "They have good hard legs and feet, head rather large and plain, and shoulders a bit straight, but they are hardy, useful little animals, well suited to stand exposure and poor feeding, and when brought on to good keep it is wonderful how they grow and improve. Colours: black, bay, and brown, with a few duns and greys."

(2) *The High-Class Riding Pony of the West Highlands and*

Islands, running from 13·2 to 14·2. "But few remain. They belong to Mull, Tiree, Skye, and Uist, and parts of the Western mainland, and show a very strong cross of Arab blood, which is believed to have come by Spanish Armada horses or Arab chargers brought home by Highland officers. The ponies have beautiful heads and good shoulders: are good all over; famous for staying through long journeys under heavy weights and on poor keep. Colours: black, brown, dun, and grey, with a few bays; the duns and greys generally show most Arab blood, though no Arab cross can be traced for generations."

(3) *The Highland Garron*, the native work-horse of Perthshire and the Central Highlands, is a good deal bigger than the others, but it is limited in numbers. The centre and fountain-head of this breed is the Duke of Atholl's stud at Blair Atholl. The colours are black, brown, dun (with or without a stripe covering the backbone, bars on the fore legs, and dark points), piebald (black or brown and white), bay, and grey. Tufts of white hair appear at times on any part of the body. Dappling is quite common, and dappled cream becomes white with age as grey does. Munro Mackenzie describes them as having "good game heads, bold eyes, shoulders a bit straight and back long, with the best of legs and feet, a good tuft of hair on the heels, and often a very well set-on tail," and as "originally bred from small ponies crossed with large horses." They are short and stumpy, but strong in the pastern, with a very short distance between the knee and the fetlock. They have short ears, good-sized, sagacious-looking heads, with great strength of jaw, and big, wide-open, clean-cut nostrils. They show no trace of Arab type or origin. They run up to 15 hands (the mares at Atholl are 14 hands and the young stallions 14 hands), and are undoubtedly the biggest and most substantially built pure-bred ponies in this country—the majority of them strong enough to haul with ease a ton-load on a macadamised road. They are unequalled hill ponies for staying power at low speed, sure-footedness, and for carrying heavy loads of deer or smaller game on rough hillsides and mountainous places, and bearing the sportsman to the shooting ground. They possess the strength of the cart-horse, with the nuggety build, steep, powerful shoulders, and low withers of the best normal type of mountain pony. Many are weak in the muscular development of the second thigh. The grey mares (which, curiously enough, are often a degree heavier than the others) produce black or dark dun-brown foals, with a silver hair through the foal coat which, like that of the Percheron, is replaced by a grey coat. This very striking similarity, the weakness of the second thigh, and the strong resemblance in general appearance to the Percheron breed, affords strong presumptive evidence that the

"large horses," which were crossed many years ago to form the Garron breed, were Percherons. That a breed of Garrons could now be produced by a similar combination, even if the real type of Highland pony could be found, is highly improbable, as the existing breed has been subjected to a long period of acclimatising and to the natural selection of the survival of the fittest. They are not usually housed in winter, with the exception, as at Blair Atholl, of a shelter shed to which they have access at will; but formerly, when the numbers were greater, no shed was provided for the young unbroken stock, and no food supplied beyond a short allowance of straw while snow covered the ground, or frost remained unusually long. They became very lean in spring, but picked up rapidly when grass came. This seems to be a breed which a unique combination of circumstances has admirably formed in shape, size, and constitution, for a special purpose, and any attempt to "improve it," as it is called, by crossing, is practically certain to ruin it in one or other of its essential characteristics.

The Atholl Stud is said to be probably the most typically pure strain. Wm. Dalziel Mackenzie, of Farr and Newbie, Daviot, Inverness, has another pure stud, but not of the Atholl blood. The stud of Donald Stewart, Drumchorry, Pitlochry, has been bred on the male side from "Herd Laddie," the famous Atholl sire, to whom and his progeny many mares of a pony type were at one time sent from all parts of the country. Some good mares, but not for breeding, are in the possession of Lord Willoughby de Eresby, near Comrie; and of Edward Ormiston, keeper, Gaick Forest, Kingussie. They are said to be able to do well on one-third less food than a Clydesdale. The Clydesdale-Garron cross is quite a success. The Garron gives the form and the Clydesdale greater size. The polo pony cross is far from satisfactory.

The **Shetland Pony** or "Shelty"[1] is one of the oldest breeds of ponies in existence, and one of the most symmetrically shaped and active, as well as the most useful and hardy. The discovery in 1864 of the Bressay stone, on which a horse is sculptured in relief, furnishes evidence that ponies may have been in the Islands as early as the sixth century, A.D. The ancient Norse name of the mainland of Orkney, "Hrossey" or Horse Island, probably indicated the presence of horses not far from Shetland as early as the Norwegian invasion. The diminutive size and hardy constitution are the product of the law of the "survival of the fittest" from extremely trying conditions, especially during winter, when, forced by starvation, they subsist on seaweed picked up on the shore. The trying climate and scanty food are the safeguards of the purity of the breed, which has frequently in ignorance been crossed with imported blood: the mongrel progeny tending to die out in the course of time. Shetland ponies live till they are thirty or forty years old and more, and they are said to be "foaled in the field, live in the field, and die in the field." A pony mare rarely produces more than one foal every second year. Until foals are two years old "their covering is wool rather than hair." The natural coat in winter is long and shaggy, while the new hair in summer is short and sleek. The form resembles that of a well-shaped Clydesdale, with good, characteristic action. The smallest recorded specimen is said to have been only 26 in. high. The average height is 40 in., and no pony of more than 42 in. at four years old can be entered in the *Stud Book*—the diminutive size of the breed being one of its outstanding features. Any pony over four years old is capable of carrying a man, and often his wife behind him, at a rapid pace. Although blacks, bays, and browns are favoured, mouse colours are said to be most prevalent; and grey, cream, chestnut, and piebald are also represented. There are about 5000 horses, including ponies, in the Islands, or only half the numbers recorded in 1882. There is an excellent market in America and Canada for registered Shetlands, and a good demand in Great Britain for well-shaped specimens that move well in saddle or harness. Undoubtedly the demand for ponies to work in the coal seams in the North of England first gave real commercial value to Shetland ponies as they practically had this market to themselves till Iceland began to compete. At present (1920) the demand apparently exceeds the supply, and prices of £35 and over are freely given for horse ponies of three to four years, measuring 39 in. Their low but powerfully built frames enable them to go where taller ponies could not enter, and they do the work of any other breed of pony measuring a hand higher. Their docile temperament and tractable disposition are remarkable in comparison with ponies of any other British breed. Their sure-footedness, intelligence, and good-nature make them ideal companions and pets for children.

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[1] From "Hjaltland," the original form of Shetland. See the Introduction in Vol. I. of *The Shetland Pony Stud Book*, 1891, to which indebtedness is acknowledged.

THE DOMESTICATED ASS,[1]

Equus asinus, differs from the horse mainly in the absence of wartlike processes (chestnuts) on the hind legs; in the croup being higher than the withers; in having contracted upright hoofs, long ears, and a short erect mane; in the hock being longer, thinner, and weaker than that of the horse; in the long hair of the tail being confined to a tuft near its extremity; and in the sound of its voice or call. The difference between the bray of the ass and the neigh of the horse needs merely to be mentioned, not described. The voice of the mule has a sound intermediate between the two.

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[1] Refer also to *Horses, Asses, Zebras, Mules and Mule Breeding*, by Tegetmeier and Sutherland, *Field* Office, London, 1895.

The domesticated species is generally supposed to be most nearly related to the wild ass of Abyssinia (*E. tæniopus*). The wild ass of Central Asia (*E. onager*), which is noted for its swiftness, and for more slender build than that of those already mentioned, also differs in having shorter and less sharply pointed ears. The diminutive size of the common British and Irish donkey is due to two main causes: (*a*) the want of attention in breeding, and (*b*) the coldness of the climate, which, through generations of neglect, has been permitted to exercise its full influence.

Three black stripes, one down each shoulder, and the third along the line of the back-bone—said traditionally to represent the results of the three strokes given by Balaam to his refractory ass—though regarded as typical characteristics of the ordinary Brown or Mouse-coloured Donkey, are not always present. In relation to other dark markings, Darwin in *Animals and Plants under Domestication* says: "With the Common Ass, as the legs of the wild progenitor are almost always striped, we may feel assured that the occasional appearance of such stripes in the domestic animal is a case of simple reversion."

The large white-haired, though black-skinned, Syrian donkey, popular in Egypt with European visitors, has no dark hair in any part of its coat. A small star is the only white marking seen on a dark haired donkey, and that rarely.

"The ass is never of a bright bay, chestnut, red, or blue-roan or nutmeg-grey." The best colour is dark brown or black with a mealy ring round the muzzle. In countries where the ass is held in high favour — for example, in Syria, Arabia, Upper Egypt, Spain, and in the United States — where it was introduced by General Washington — it is represented by animals of special excellence and value. In America there is a great impetus given to breeding donkeys, by the trying nature of the climate for horses. In Kentucky, Missouri, and New Orleans, where great attention is paid to the breed, not purely on account of its own value as such, but for the rearing of mules, the size of animals bred from the best imported stock frequently reaches 15·2 and 16 hands.

Of all varieties imported into Britain (Tegetmeier and

Sutherland), "the **Catalonian** is the finest animal, being a good black, with white or mealy points, of fine style and action, and from 14½ to 15 hands high, rarely 16 hands, with a clean bone. It was from this breed the Kentucky jackass sprang early last century. The **Andalusian** is about the same type, having a little more weight and bone, but they are all off-colours. The **Maltese** is smaller than the Catalonian, rarely being over 14½ hands high, but nice and smooth, refined and thoroughbred in appearance. The **Majorcan** is, with the exception of the French Poitou, the largest of the imported jacks, the heaviest in weight, bone, head, and ears, frequently growing to 16 hands, but lacking in style, finish, and action. The **Italian** is the smallest of all, being usually from 13 to 14 hands, with good feet, bone, and weight." The **Poitou**, a brown ass, the last imported into the United States, is said to have sprung from Spanish stock, although the difference in structure and character is now great; even the loud and sonorous voice is quite different from that of the other breeds. The Poitou ass corresponds to the heaviest of our heavy breeds of cart-horses. His limbs are very large and massive, but the bones usually good and flat, measuring from 8½ to 9 in. below the knee-joint, which is very large. His feet are much bigger and less narrow at the heels than the feet of other donkeys, and his pasterns short. The body is heavy, the chest broad, the shoulders upright, the back straight, the neck of medium length, broad, thick, and strong, the lips pendulous and the ears enormous, so that in some animals they bend over and hang forward like the lop ears of certain breeds of swine. The whole body is covered with long and shaggy hair, including frequently a long mane and forelock. A large head and ears, and an unkempt coat, are points of excellence among home breeders. The females are 13 to 14 hands, and the males run up to 15 hands. The Poitou Jack (Plate CXLIII. A.) mated with mares of our three heavy working breeds of horses, would produce the finest of draft animals, and for many descriptions of work might with great advantage be bred and used in this country. The First Prize Jack of this breed at the Paris Exhibition in 1906 sold for over £500. Mule breeding is one of the most remunerative of local industries in France.

The Mule, properly so named, is the produce of a cross between a jack-donkey and a mare, while the animal produced by a stallion and female ass is a "**hinny**" or "**jennet**." The latter is rarely seen, and is inferior in value and usually in size to the mule, which is a most valuable equine beast of burden in hilly regions or in hot countries, being more surefooted and possessing greater powers of endurance than the horse, more especially when both have to live on poor food. In external form the mule most strongly resembles the ass; but when bred from a heavy draft mare, it combines with this something of the superior stature and massiveness of the mother.

The mule has not been much used in this country, except for a time in tramway cars in London, Glasgow, and a few other populous centres, subsequent to the sale of pack mules which occurred after the close of the last Egyptian campaign —the Arabi rebellion of 1881. The Secretary and Manager of the Glasgow Tramway and Omnibus Company wrote, in September 1892—"We have now no mules, having allowed them to run out"; no doubt because there exists no means of procuring them in the open market in this country. Mules have some advantages over horses in tramway work: (1) they are not particular as to the quality of their food, and they consume less by about 7 lb. per day; (2) being very surefooted they are not nearly so liable to fall; (3) they are durable, and fully four miles per day more can be taken out of them than out of horses. They are not only hardier and less liable to become lame, but, in competition with horses of their own weight, they have more pluck and perseverance in overcoming difficulties, they walk faster with a load, pull more steadily, and are more powerful. Consequently, where mules are understood and appreciated, the price of a work mule is relatively higher than that of a horse. They are easily broken to work at two years old, but they require to be treated with patience and kindness combined with firmness. Although a mule is not so cleanly in its habits as a horse, it displays less excitability and more sense should it shy in the yoke and run away. It will not continue in a mad career till it collides with something and comes to grief, but after the first rash impulse is past, will pull up and settle down to a normal pace.

The good qualities of the mule in the performance of farm work in England were demonstrated towards the end of the nineteenth century by Edward Pease, of Darlington, and by C. L. Sutherland of Down Hill, Down, Kent, who at Coombe, Croydon, a farm of 300 acres (90 being arable) did all the work by mules that consumed a bushel of oats each per week with green clover in summer, and one and a half bushels of oats each per week with hay during winter. About the same time W. S. Ferguson, Pictstonhill, Perthshire, Scotland, bred splendid mules for agricultural purposes, by a Spanish jack on pedigree Clydesdale mares. After ten years' experience he pronounced a pair of them to be equal to the two best horses in his stable, ready and able for every description of farm work, which they did on less food, without ever having required the attendance of a veterinary surgeon.

In America they are extensively employed. The U.S. Agricultural Returns for 1890 show the existence of 2,314,785 mules in the United States, which take their share in the work of the country with the 15,258,783 horses which appear in the same table. The corresponding numbers for 1920, 4,995,000 mules and 21,109,000 horses show the increasing popularity of the mule, where its qualities are best understood. The 16-17 hand mules of Missouri, Kansas, and some of the Eastern States, are for weight and substance unequalled in any part of the world. During the Boer War in South Africa, 124,729 mules were purchased for service in the British army—73,000 of these being supplied by the United States; and C. L. Sutherland said: "It was considered by many competent authorities on the spot, that but for the North American mule the war would never have been finished." In spite of this national experience of the inestimable value of mules for any purposes, mule-breeding is not making much progress in this country.

The male mule is barren. In recognition of this well-authenticated fact the Arabs have a saying that "when the mule breeds, men will become women and women men." It has been established that, on rare occasions, the female mule has been known to breed, Professor Arren Lloyd-Jones of Iowa State College, in an illustrated article in *The Journal of Heredity*, vol. vii., No. 11, November 1916, accepts this view and discusses the subject very fully, showing from studies of germ cells that the chance of a mule breeding is very slight. Professor C. S. Plumb of Ohio State University, in the revised edition of his *Types and Breeds of Farm Animals*, illustrates and gives the history of a female Australian mule that breeds.[1] Many authentic cases are on record of female mules giving a copious supply of milk to foals that have adopted them as foster mothers. (See Appendix P, "Fecundity of a Mule.")

It is a mistaken belief that the mule is more feeble as a young foal than the pure-blooded foal of the mare or of the she-ass, unless it be deprived of its mother's first milk, as among the ignorant peasantry of Poitou, who mistakenly consider it to be poisonous. On the contrary, it is specially energetic and active immediately after birth, rising and sucking without aid within a very few minutes. It is, however, longer in reaching maturity, but it lives longer, and may be worked for a longer period than the horse. The female mule meets a more ready sale than the male, and she comes more quickly to maturity. A mare carries a mule foal for 333 days, and the height of the mule usually follows that of the mother, and not infrequently exceeds it. There is frequently much difficulty in getting both mares and jacks to mate, unless they are run together as young foals, and when mated they do not breed so certainly as animals belonging to one species. These are discouragements to mule-breeding being introduced in this country. The want of the technical knowledge necessary to the successful management of the enterprise, as well as its being contrary to the sentiment of the country, also militates against it.

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[1] See also *Genetics in Relation to Agriculture*, Babcock and Clausen, M'Graw-Hill Book Company, New York, 1918. *The English Veterinary Field*, 17th September 1918. "Causation of Sterility in the Mule," by J. S. Wodsedalek, *Biological Bulletin*, xxx., 40, and *Beebe Veterinary Times*, St Paul, Minn., 1st July 1921, which details an authenticated case of a colt being born to a mare mule.

Zebrules or **Zebroids** some years ago excited much public interest, on account of the appearance of reports of experiments conducted between 1896 and 1904 by Professor Cossar Ewart at Penicuik, Midlothian, about 15 miles from Edinburgh. There "Matopo," 12·2 hands, a Burchell zebra stallion, variety *Chapmani*, from the Transvaal border, by a great variety of ponies and a few larger mares, bred some sixteen zebra mules (Plates CXLVI. and CXLVII.). They proved to be very hardy, resisting the winter cold at an elevation of 800 ft. above the sea. They had double the number of stripes common to the zebra, and were without exception bright, intelligent, and handsome in appearance, had excellent feet and clean limbs, with wonderful bone when the strength of the mothers was considered. They were good-natured, and more or less tractable for mules, and were broken to the saddle and to harness. The two tallest specimens, over 14 hands, went to work in a mountain battery in Northern India.

The official reports on this pair were not entirely satisfactory in relation to the unsuitability of their feet to a hilly country; their need for a larger amount of food than the ordinary mule; and their suffering from fever and catarrh and falling off in condition with hard work. But the trials were not extensive enough, nor carried on long enough, to settle the question of the suitability or otherwise of the zebrule for military purposes.

Carl Hagenbeck, of Hamburg, secured eight of the number when the Penicuik experiments came to an end. Six of them were sent to the St Louis Exposition in 1904, and sold, to develop an interest in America in the new cross. The two retained by Hagenbeck, and valued at £200, were regularly driven in his private carriage, and were said to be good workers, doing quite 50 per cent. more than a horse. It is thought that zebroids are stronger for their size than common mules, and there can be no difficulty in breeding them up to 16 and 17 hands, by Grevy's Somaliland zebra on mares of any of the heavy cart breeds. The first zebra cross on record appears to have been bred by Lord Clive (1776), by mating a common jack and a female mountain zebra. Mountain zebra crosses are reported to be more difficult to handle than other zebrules, and those by underbred mares worse than those showing some quality. Similar crosses were bred in Italy and in Paris early in the nineteenth century. Zebra-ass hybrids were bred at Knowsley and at Windsor Park in the reign of George IV. Zebra crossing in different ways was carried out later in Paris and Melbourne, and several similar crosses were bred by Lady Meux at Theobald Park, Hertfordshire. Lord Morton's famous Quagga-Arab cross was produced in 1815, and Lord Mostyn bred another of the same. The first genuine mule-zebra by a Burchell sire, and probably the most perfect specimen that has yet been produced, was Ewart's "Romulus" by "Matopo" out of "Mulatto," a West Highland pony, in 1896. Baron de Parana, of Brazil, has since bred a number of useful animals in a similar way. The zebrule is not proof against the poison of the tsetse fly, *Glossina morsitans*, but this is not to be wondered at, as the zebra bred away from the fly country is itself not immune.[1]

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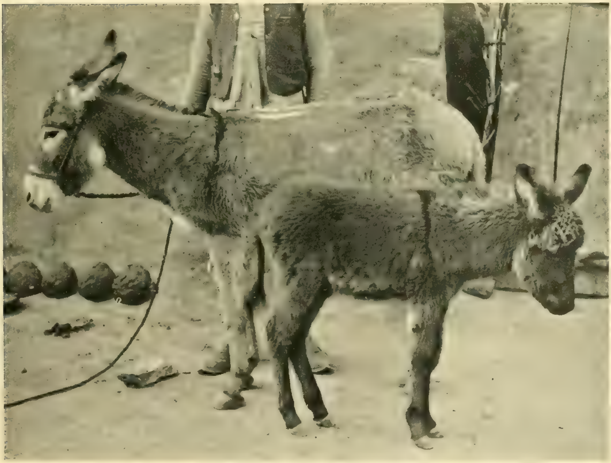
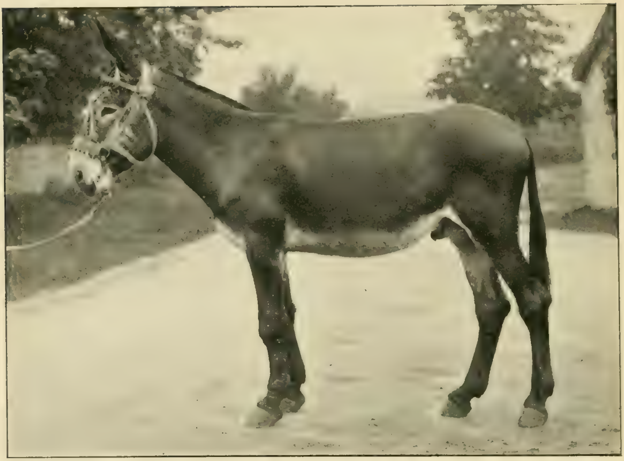
[1] For fuller particulars, consult *The Penicuik Experiments* (Ewart), published by Adam & Charles Black, London, 1899; papers in the *Journal of the Highland Society* for 1902; and, "The Utility of Zebra Hybrids," by Thos. H. Dale, in *The Transvaal Agric. Journal*, 1904.

A. Common Brown Irish Ass in the yoke.

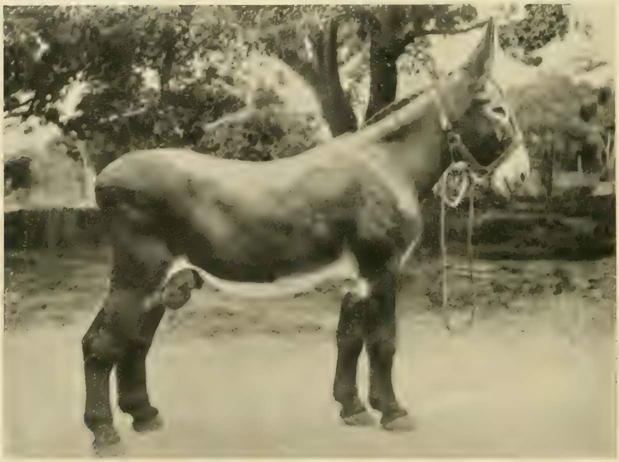
[*"Agricultural Gazette Photograph."*



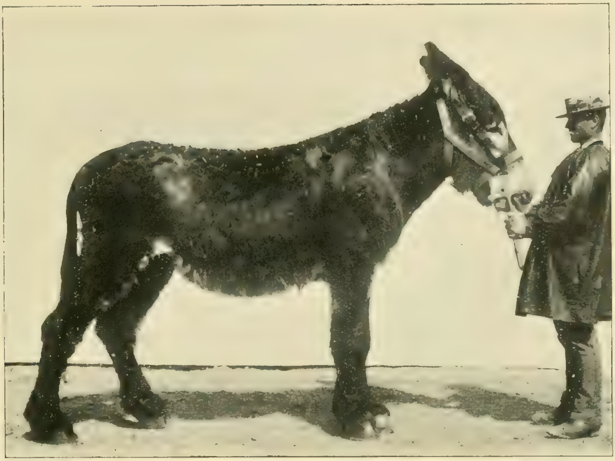
B. Common Brown Donkey and Foal.
Bred in Western Rajputan State.



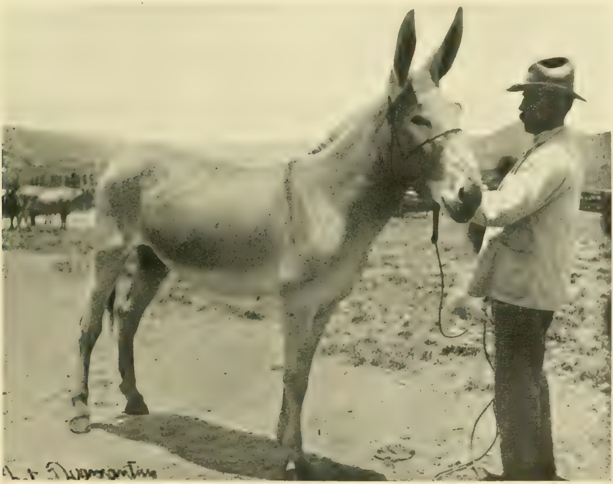
A. Catalan Jack.
First prize at the Royal Show in 1906.
The property of the late Harold Sessions, Wootton Manor, Henley-on-Thames.
[*E. G. Ballard, Chepstow.*



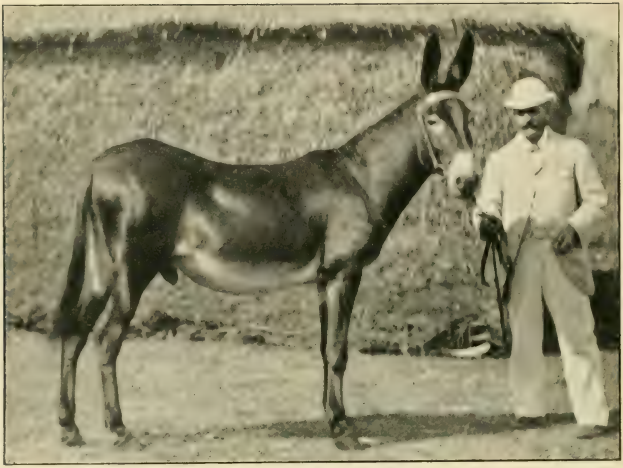
B. Donkey Stallion from Jamaica.



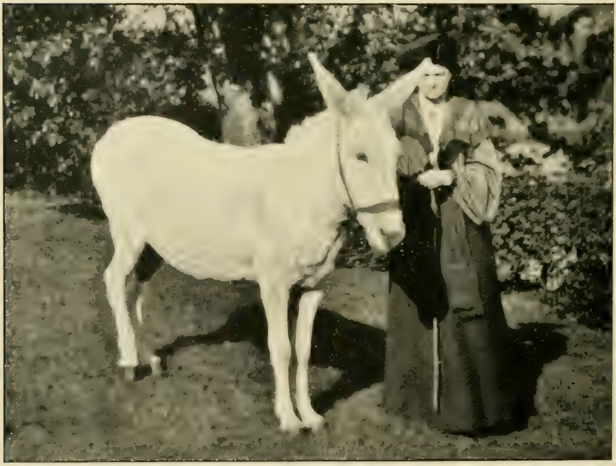
A. Poitou Jack, 14.2½ h.h. Worth £320.



B. Andalusian Jack, 1.42 metre in height.
Exported to Argentina.

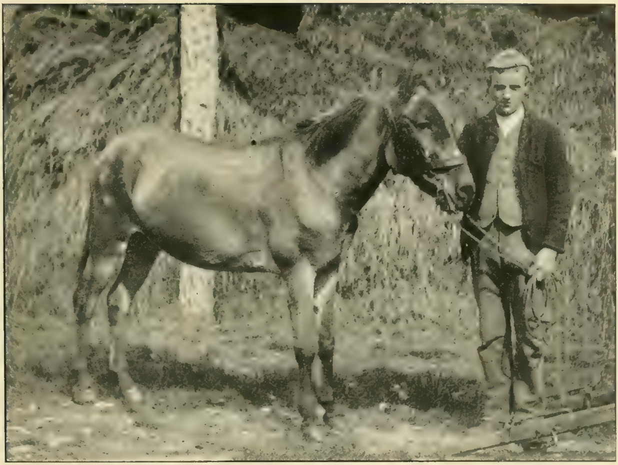


A. Maltese Jack. 14.1 h.h.

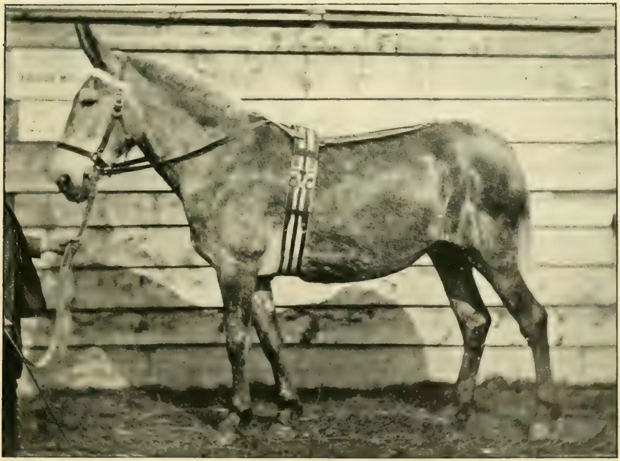


B. White Arabian She Ass, "Nephthus." Imported from Egypt.
The property of Lady Dunbar, of Mochrum, Kirkcudbright.

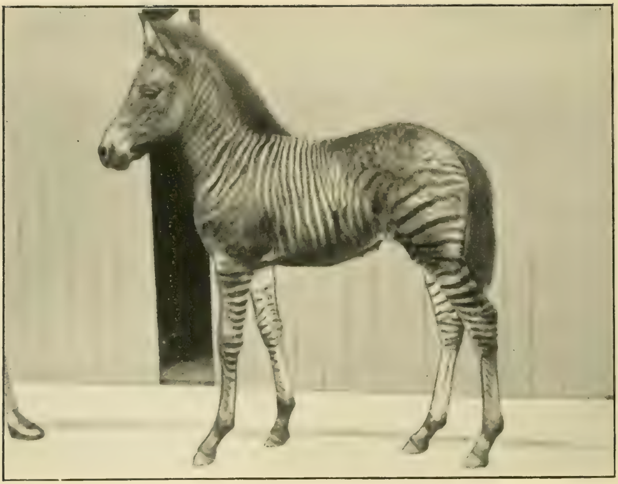
[*Photo by Sir Wm. C. Dunbar of Mochrum, Bart.*



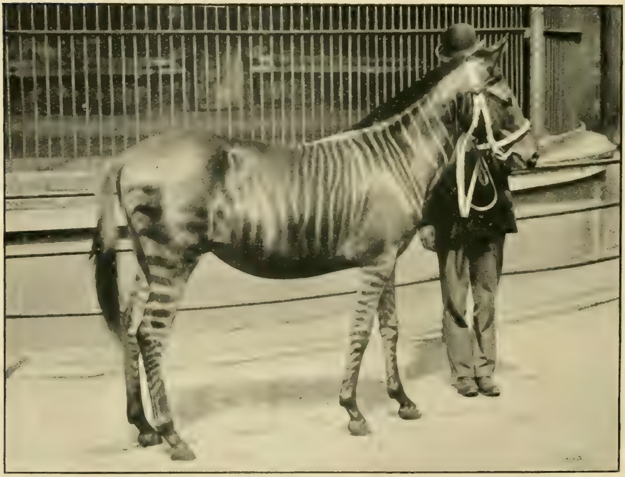
A. Irish Jennet, 13 h.h. (23 years old).
The property of C. L. Sutherland, Downe Hall, Downe, Kent.



B. Poitou Mule.

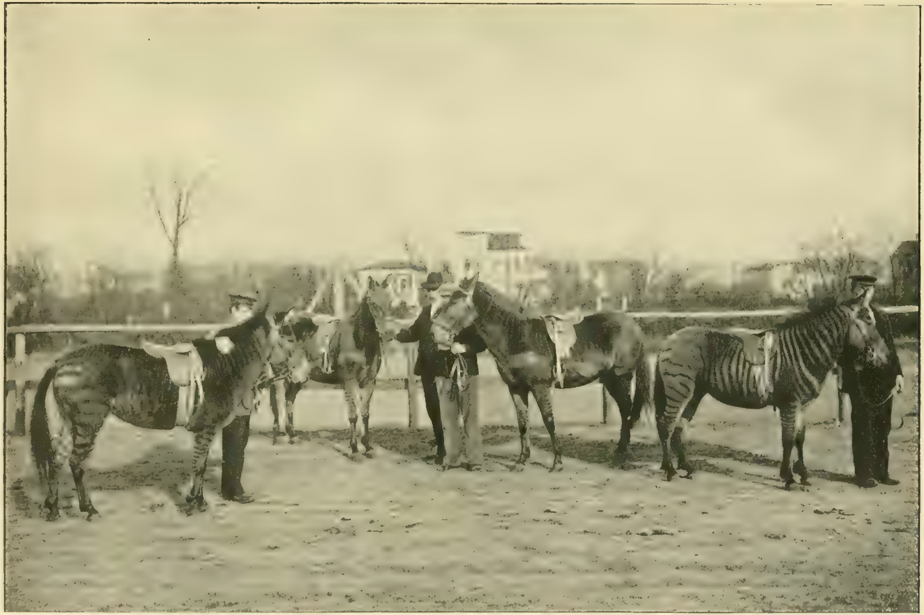


A. ZEBRULE, "ROMULUS," as a foal.
Sire "Matopo," a Burchell zebra; dam "Mulatto," a black West Highland pony, 13 h.h.



B. ZEBRULE, "REMUS."
Sire "Matopo"; dam "Biddy," threequarter-bred Irish bay mare, 14 h.h.
Both bred by Prof. Cossar Ewart at Penicuik, Midlothian.

PLATE CXLVII.



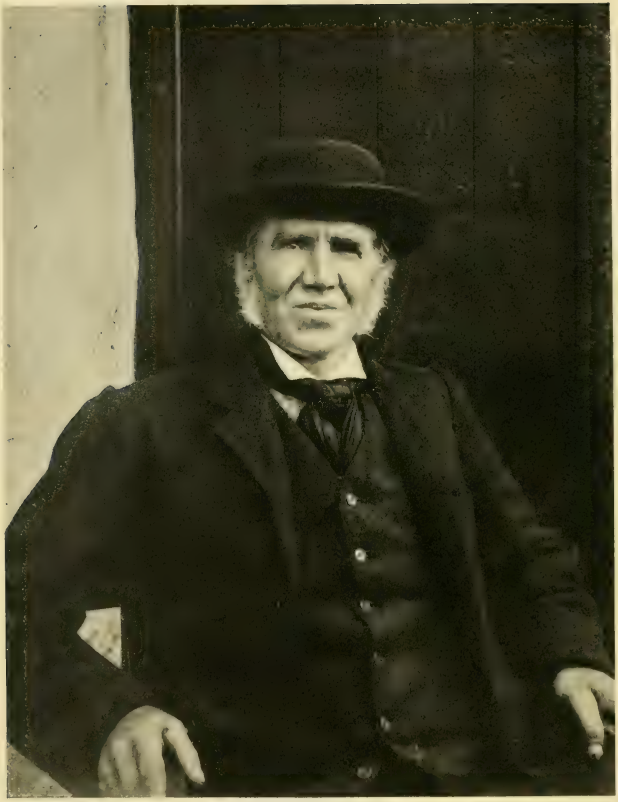
1. 2. 3. 4.

Zebra Hybrids by "Matopo," a Burchell Zebra.

(1) "St John," dam a skewbald Iceland pony; (2) "Valdas" (twin), dam a thoroughbred chestnut polo pony; (3) "Remus,' dam "Biddy," threequarter-bred Irish bay pony, 14 h.h.; (4) "Lorna," dam Highland pony—forest type.

Bred by Prof. Cossar Ewart at Penicuik, N.B.

[*The late Carl Hagenbeck, Thierpark, Hamburg.*



David Gray (Sen.). A typical Scottish herd (pp. 1 and 607) whose flock was his hobby (See also Preface). He worked devotedly for the Author's family for well over thirty years.

CHAPTER XXIV

THE HORSE (*continued*)—BREEDING AND BREAKING

Breeding—Selection of the Mare—Shelter Treatment of a Farm Brood Mare—Taking the Horse—Difficulties about Conception—The Stallion—Dourine—The Foal—Rearing by Hand—Joint-ill or Navel-ill—Haltering and General Treatment—Young Cart Horses—Young Blood Stock—Food of a Colt—Castration—Docking—Breaking—The Age of a Horse from his Teeth—Williams's Horse Measuring Standard.

SOUND, well-built, and compact animals of good blood and good pluck, and free from any vicious tendency of temper, should be selected to breed from.

Three years old used to be considered the proper age to put a mare to the stallion, since with an immature dam, as with one too old for breeding, the foal may be small and weakly. But in the earlier maturing breeds, such as the Shire, fillies are often put to the horse at two years old with excellent results. Prize-winning two-year-old fillies are kept back for a time in the interests of their showyard career. Two-year-old colts may serve a limited number of mares, say from ten to twenty, according to their development. May is the best month for foaling, as there is then an abundant supply of green food, and the weather is mild enough for brood mares to lie out in the fields. Where shelter is available, in the form of cosy paddocks, shelter-sheds, or loose-boxes, there is an advantage in the case of animals which are to enter showyard competitions, to be born two or three months earlier. Since *Stud Books* came into existence, ages usually date from the first day of January, and it is difficult for the best young animal to make up age-leeway during the first two years.

Substantial **inexpensive sheds**, sheltered from the cold east and north winds, are made of old railway sleepers, usually 9 ft. long by 9 in. wide, placed on end to form the walls, and sunk 2 ft. into a dry piece of ground with a good fall for the escape of surface water, with a roof of light scantling covered with corrugated iron, and gutters under the eaves to carry off the rain water. In a mining country like Lancashire, where iron is destroyed in a year or two by furnace and pit fumes, ⅝ in. white pine boards may be substituted, and creosoted or painted with "Stoprot," or some other form of preservative. The floor of the shed and an entrance-way is formed of a thick layer of gravel, furnace slag, or burnt clay. Such shelters prevent chills till genial weather comes, and are also a valuable protection from flies and a scorching sun in summer. The **period of gestation** is about eleven months. Small but increasing amounts of green food should be given for a few days before the mare goes out to the field, to accustom the digestive system to the change, and thus to prevent colic—a rule to be observed with all classes of animals about to be changed from hard food to grass.

A farm mare should continue till the day of foaling to do a moderate amount of light work, such as ploughing, but should not be put between shafts for some months before it, as, owing to the enlarged size of the belly as parturition approaches, there is risk of injury from the shafts. The quantity of concentrated or rich food ought to be restricted in the case of a mare in high condition some little while before her time is up. A roomy loose-box is a usual place for the mare to occupy, beginning two weeks before foaling. Although the field is for many reasons the best place for a mare to foal, particularly in view of the fact that joint-ill (or navel-ill) is frequently contracted through contamination in a box, yet there are dangers to be guarded against in the field. The fences should be good and there should be no ditches or ponds in the pasture. A disadvantage, too, arises from the fact that the mare cannot be so well watched and, a mare foaling easily, the cleaning may come away with the foal and smother it. Within twenty-four hours of foaling, and at times earlier, wax-like little scales, becoming at last bright and nearly transparent, are seen on the tips of the teats. These are two in number, laterally flattened, and each provided with two openings or milk passages. After the wax appears the mare should be regularly watched day and night by an attendant, who can see without being seen, to prevent her doing injury to the foal at birth by lying down with her tail too close to the wall. In the event of a false presentation or other serious difficulty professional aid is necessary. When natural parturition occurs, the act is more rapid than in the case of horned cattle, or other farm animals, and the danger of strangling the foal during delay greater. After a prolonged delivery the mouth of the exhausted foal should be cleared of slime, and air blown down its throat, to aid the first inflation of the lungs. In nature the tearing of the umbilical cord as the mare rises prevents after-bleeding, but, when aid is necessary, it is usual to tie it with fine tape or string, saturated in a 5 per cent. solution of pure carbolic acid, in two places and sever it with a knife between the knots about an inch from the belly rather than to attempt to imitate nature by roughly breaking it. The navel should also be well soaked soon after birth. If the mare be slow to lick the foal, it should be rubbed dry to prevent it growing cold, and, if weak on its legs, it should be supported and held in position to encourage it to suck as soon as possible. If this is unsuccessful, half a teacupful of milk should be drawn by the forefinger and thumb from the mare's teats into a vessel, warmed, if convenient, by dipping into hot water, and poured into the foal's mouth with a table-spoon, as a new-born foal cannot long survive without food. If everything has gone well and the foal is strong and warm and only awkward on its legs, some breeders think it best to leave nature to its own course, and the foal by instinct soon finds its way to the teats. Beyond these precautions the mare rarely requires assistance. To see that the anus of the foal is not by chance closed by an adventitious skin or membrane which requires to be broken, and to give the mother frequent small drinks of natural water with a little oatmeal thrown into it, along with a suitable amount of succulent digestible food, is all the further treatment necessary under normal circumstances.

The meconium is the first dung; it is usually hard, sometimes extremely so, and there may be difficulty in passing it. It is a good practice to give the foal an ounce of warm castor oil soon after birth. An enema of oil or soap and water helps to expel the meconium if it does not come away readily. A mare should "clean" naturally within an hour or two after foaling.

Retention of the "cleaning" is much more dangerous though fortunately rarer in the mare than in the cow. It is frequently accompanied by inflammation of the womb and blood-poisoning and by a grave form of fever in the feet (laminitis). If the membranes are not expelled in twelve hours they should be removed by the veterinary surgeon. It differs conspicuously from that of the cow in the form of attachment to the uterus, being generally adherent to the internal surface of the womb. The ailment known as "hanging cleansing" is often fatal if not promptly attended to, and may be contagious. To get rid of it, should it become established on a farm, disinfect the houses, lime the pastures, and stop breeding for a time.

Eversion of the womb is sometimes observed in the mare. When this occurs a veterinary surgeon should at once be called in. Meanwhile a blinker bridle should be put on the mare and she should be tied up to the rack to keep her, if possible, from lying down. A couple of men ought to support the womb in a sheet to prevent its being injured. If a dose of sedative medicine (laudanum, chloral, chlorodyne) is obtainable it may be given. The foal must either be removed or shut in a corner of the box by a gate.

Pervious Urachus.—The urachus is a tube which in the fœtus conveys the urine from the bladder to the fœtal membranes. At birth the urachus closes and the urine is expelled from the bladder to the exterior through the urethra. Sometimes, however, the urachus does not close and the foal urinates partly by the navel and partly by the penis or vagina. Immediate steps must be taken to close the urachus, which is usually done by firmly ligaturing the navel and cauterising the stump. Pervious urachus is often followed by navel-ill.

Succulent food, such as roots that are available at the season, or a mixture of steamed barley, Indian corn, a few beans and bran, given at a temperature not over 60°, encourages the flow of milk before grass comes; and daily exercise and fresh air, avoiding cold and draughts, are essential for the healthy development of the young animal in all its stages. Some breeders relieve the pressure of work on the attendants in the early spring months by arranging for half their mares to foal in November. The cost may be four or five pounds more, but mares getting a liberal supply of roots or steamed food milk very well, and are ready to take a share in spring work and let the foal be weaned in May. Should the navel of the foal be attacked by flies and become raw, it may be wetted with an infusion of walnut leaves, and dry flowers of sulphur powdered over it, to encourage healing and to ward off flies.

No nursing mare ought to be put to work if it be possible to avoid doing so. This precaution reduces the chances of the development of scouring or of rickets in the foal, which may grow up into a fine animal. In any case, she should have a clear month's rest after foaling before going to work, and should then go only for half a day at a time. After returning from work a little milk should be drawn before the foal is allowed to suck. The milk which collects in the udder while the animal is at work is poorer in fat than milk drawn at frequent intervals, and it also changes in character from natural milk, and may develop poisonous substances injurious to the young.

Mares that are served at the "foal-heat," eleven days after foaling, "hold" most readily. They remain "in use" at this period for three days, but on other later occasions they should come in season every three weeks during the spring and early summer months and remain "on heat" for about a week. A mare that breaks at four in place of three weeks is not likely to conceive. In certain years mares are irregular in coming to foal-heat, and are at times as late as seventeen days. If missed or neglected during the first heat some mares are not easily caught again for a time or two, if at all, until the foal is weaned and they are in any case not so easily "settled." A mare, like a cow, may have conceived at the first covering and yet take the horse three weeks later as if she had not done so, and thus put her attendant out of his reckoning as to the time she should foal.

By the second time a mare is in season there is a large flow of milk, which to some extent reduces the system and renders conception less certain. A mare covered when going out of season is then most likely to "hold" or "stint." One good "jump" or connection is better than several at one time or on one day; but in the event of a mare being covered soon after she comes in season, it is an excellent practice to give her a second chance in a day or two, or just before she goes out, and she should be kept quiet and away from other horses for a few days to prevent excitement and the consequent repeated attempts by "showing" to discharge the contents of the uterus and vagina. If this be attended to there is no necessity for douching her with cold water, which is surely an unnatural and unnecessary practice under any circumstances. It also appears to be wrong to put a mare to two horses within two days, though the practice of "crossing" a mare with a second horse, if there be any doubt about the potency or ability of the first stallion, tends to increase the number of successful connections. When a mare fails repeatedly to conceive she should be examined for stricture of the passage into the uterus, and, if necessary, the opening extended by inserting a finger or thumb. If she be in a plethoric condition, two or three pints of blood may with advantage be drawn from the jugular vein at the time of service if she has not been breeding for some years.

A stallion can serve eighty mares, the number approved by authority, in the season, and get on an average forty to fifty foals, if he be not made to travel too great distances to find the mares. Some valuable horses, that are such sure foal-getters that mares "settle" after the first connection, may cover a hundred and some even a hundred and thirty. A horse with one stone down can get foals, but he cannot do so if both testicles be carried out of sight. **Cantharides**, or "Spanish fly," is given by ignorant grooms to entire horses under the mistaken impression that, because it increases sexual excitement, it increases sexual power. The other effects of the drug are frequent urination and blood-stained diarrhœa. "*Treatment.*—Give demulcent drinks and small doses of laudanum, but avoid oils."

Dourine is a chronic contagious disease of the horse affecting only breeding animals, the virus being conveyed from stallion to mare, or *vice versa* at the time of service. It was erroneously thought to be syphilis, which it somewhat resembles. Dourine is caused by a unicellular blood parasite, a Trypanosome, found free in the blood and tissues of affected animals. Sleeping-sickness of man, surra of animals, and many other contagious diseases of tropical or sub-tropical countries are similarly produced.

The disease occurs in most European states, and is widely disseminated in Northern Africa. The Ministry of Agriculture and Fisheries has recently called attention to an outbreak in Belgium and France, where it was introduced by German Army horses.

Mares infected by stallions show in two to four weeks: redness and swelling of the vagina with a yellowish slimy discharge. Little nodules, which grow into ulcers, are found on the vaginal *mucosa*. The mare shows signs of œstrum, switching the tail, straining, and ejecting small quantities of urine.

In **the stallion** the first symptoms are swelling of the sheath, and redness, swelling, and the eruption of nodules on the penis. These local symptoms may entirely subside, but are followed a few weeks later by a second stage in which the skin and the nervous system are involved. Crops of rounded blebs or plaques appear for some days on the skin of the sides and rump and other parts of the body, then disappear, to be followed by other crops. Concurrently, the skin over the entire body, or along certain nerves, becomes extremely sensitive. The nerve trunks themselves show great increase of sensibility, and pressure causes pain. Lameness results from this cause. Later there is degeneration of the nerves, and finally paralysis and death.

Treatment, which is not very satisfactory, consists in the administration of arsenious acid and of atoxyl or of arsenophenylglycin.

It is frequently difficult to notice when small pony mares are in season, as they are not so demonstrative at this time as large animals. They should, if possible, be turned out to graze with a stallion. As a mare approaches twenty years of age, the chances of her conceiving, if she has never bred, or if she has not bred for some years, are not great. When a mare is in the habit of breeding regularly she will sometimes continue to do so till she is very old. "Old Stager" (Plate CXXXV. A) produced thirty-five living foals.[1] Conception is made more likely—when there is any tendency to barrenness—by the use of a cart horse on a thoroughbred mare, or of a thoroughbred horse upon a cart mare.[2]

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[1] At Bosby in 1886 the Author saw a cross-bred mare, belonging to W. Mould of the Harrington Arms, which was breeding at the age of thirty-two, and had bred twenty foals in twenty consecutive years. All were said to have been good, and a number were weight-carrying hunters.

[2] Cowe of Mains, Chirnside, possessed a mare (nearly thoroughbred), which in 1886, at the age of twenty-three years, "held" to a cart horse after repeated trials extending over several years with thoroughbreds. In 1887, however, she was successfully served by a thoroughbred. Had it not been for the breaking of a leg which ended fatally, she might have continued to breed for years.

A foal that gallops till it perspires copiously on being put out for an hour or two after it is, say, ten days old, should not be allowed to lie on the cold ground or in a draught, else it is liable to scour and swell at the joints and become worthless.

A foal brought up by hand should be fed with cow's full-milk[1]: "Clyde," *alias* "Glancer" (153), which developed into a grand horse and became a most successful breeder, was reared in this way. It is frequently spoiled in disposition through being petted or played with, so that it becomes too familiar with its attendant, and loses the natural and necessary respect for the authority of its master. An ancient practice in Norfolk after the foal is two weeks old, is to feed it on skim-milk, boiled linseed, and bean-meal, getting gradually up to 2 gallons of milk and 4 lb. of the mixture per day.

Joint-ill or navel-ill is due to pus organisms gaining entrance to the navel and producing a condition of blood poisoning. The first symptom is usually lameness. On examining the foal a joint—the hock or knee most frequently—is observed to be swollen and painful. The little creature lies a great deal and does not empty the mare's bag properly. Suppuration soon takes place in or near the affected joint, and in most cases the patient is lost. However, recoveries are not altogether rare and the services of a veterinary surgeon should be obtained. If suppuration is limited to the tissues around the joint, the opening of the abscess and the washing out of the cavity with strong antiseptics may bring about a successful issue. A serum to combat the malady is supplied by the Royal Veterinary College to veterinary surgeons. *The preventive treatment* is the most important: the boxes in which mares are intended to foal should be whitewashed, and the floors swilled with a disinfectant, and the bedding should be regularly changed. As soon as the foal is dropped, the umbilical cord should be tied with a silk ligature and the part sponged with carbolic lotion, one of the acid to forty of water. The person undertaking the tying should disinfect his hands with carbolic solution before touching the navel; also the silk should be soaked in the solution previous to being used.

Rupture in Foals.—A rupture consists of the passage of some of the abdominal organs (usually the large or small intestines) either through the navel orifice or through the inguinal canal by which the testicle has descended, the former being called umbilical hernia and the latter inguinal or scrotal hernia. These conditions, which may be observed at or soon after birth, are congenital and also hereditary.

Umbilical hernia shows itself by a pronounced swelling at the navel. It is soft and painless, and the opening into the abdomen is found to be large; and it is usually easy to return the contents of the swelling into the abdomen. A foal with *inguinal hernia* has a doughy enlargement in the position later occupied by the testicles. This swelling varies greatly in size; it may be insignificant, or as big as a child's head.

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[1] The milk, warm from the cow, should be given at first six times a day and later three times, and fortified with a liberal supply of brown sugar.

Treatment of Rupture in Foals.—So long as the foal is thriving and the abnormality causes no inconvenience, it is wise to leave well alone. Trusses should not be used, as they are impossible to adjust and they cause sores from pressure. Rupture generally disappears when the foal is a year old. The young creature, however, must be watched. Colic is apt to be caused by strangulation of the loop of bowel contained in the hernia, at the lips of the orifice through which it has descended. Then, and also when the foal is doing badly, an operation is called for. Umbilical hernia is treated by putting the patient on its back, returning the contents of the hernia, and putting a clam on the skin covering the navel. In the case of inguinal hernia the foal must be castrated by the covered operation (after returning the bowel) by wooden clam or by ligature. Both operations must be done under chloroform and by an expert.

A foal is **weaned** when it is from four to six months old, say a spring-born foal early in September; then it should be housed at night. But from the time it is a month old, it should be firmly but kindly treated and trained for a short time every few days to be led, by means of a light head-collar, which should remain on permanently, and have a short dependent end left to lay hold of. The operation of haltering, if delayed till weaning time, is attended with danger to the animal, due to the resistance which is usually made, and requires great care. A cattle-shed with bare walls and a few inches of dung under foot is a good place to select. A cart rope should be fastened round the neck of the foal to draw it up to a fixed point—such as a hole in the outer wall through which the rope is passed—so that it is made to know what it is to be held. The struggle at first is often severe, and perspiration flows freely with the excitement and the exertion. After all this is over, the foal must be kept in a warm place till it is thoroughly cooled down. Gentle treatment and constant handling are necessary to give the creature confidence. Leading should from the first be done as frequently by the "off-side" as by the "near," to accustom it to turn as readily to the one side as to the other. The young animal should also be taught to eat a few bruised oats and bran, so that it may be prevented from losing the foal flesh at weaning time. When circumstances permit, and the superior quality of the foal warrants it, this condition is most effectively maintained by allowing it to suck through the winter. The mothers of valuable foals should usually be provided with a moderate amount of bruised oats. A sufficient allowance for a Shire or Clydesdale foal during the first winter is 3 to 4 lb. of crushed oats, 1 lb. of bran, and ¾ lb. of finely-ground linseed cake, given in two feeds in the day, with ½ a peck of roots and chopped sainfoin, lucerne, or clover hay in England, or ryegrass hay in Scotland. Except in mild and sheltered districts the young animal should be housed at night, but must go out during the day on the best available pasture. As grass comes in spring, the dry food should be gradually reduced, and finally discontinued when good pasture is available. They may begin to lie out as soon as the weather becomes mild.

Young cart horses should never be too highly fed, as forcing softens the constitution, and they become too fat and heavy for the strength of their limbs. They should at all times be kept thriving to encourage growth, and to prevent disease and the injury which results from the presence of internal parasites.

Farm horses ought to run out in the fields during the second winter, within reach of good natural or artificial shelter, and be rationally fed. An excessive quantity of dry grain of any sort is liable to heat the blood, and produce skin irritation and incessant rubbing, and sometimes cracked heels. A light grain ration of, say, 4 lb. oats and 2 lb. bran, with hay and a few roots is sufficient on ordinary pasture.

Colts born in November, when about two years old should, if intended to do a full complement of work in spring, receive during the winter a mixture per week of (1) 3 stones of crushed oats and maize meal in equal parts; (2) 1 stone of crushed linseed or finely-ground linseed cake mixed with wheat or barley chaff; (3) ½ cwt. of chopped hay—clover, lucerne, or sainfoin—or an equivalent in strong boned ryegrass hay, with (4) a foddering at night of oat or barley straw to pick over; also (5) about 1 stone of roots in season—swedes, mangels, and carrots—or an equivalent in steamed potatoes. Kept on such food, they will be in condition to do good work in spring. Salt should be within reach of all young stock, which must also be allowed plenty of exercise to develop muscle. In the case of thoroughbreds, the highest authorities say that they cannot be too liberally fed, provided they have sufficient exercise.

Young blood stock, in properly fenced, high, wooden-railed paddocks, usually take sufficient exercise by galloping for amusement in rivalry with one another, as young greyhounds do. The ordinary fence of six or eight plain wires is most dangerous for a young horse. While rubbing against it, he is liable to put a fore or a hind leg through it and become entangled in the wires, which cut to the bone as he struggles to get free. A safe and effective guard is found in a single barbed wire stretched on each side of the fence about 2 ft. from it, the height of a horse's breast, and supported by strong 4-ft. crossbars, about a rod apart, fastened to the main standards carrying the wires.

Castration is usually performed when a colt is about one year old, a time when there is little risk; or it may be done at two years, if a well-developed crest and a more masculine appearance is wanted. In some districts of England from four to six weeks old is considered a safer and better time. A horse is rendered hardier by castration for racing and hunting and all classes of fast work. The operation can be performed by an expert with least risk while the animal stands on his feet, against a wall. The horse may be cast by means of side ropes or by hobbles; but the danger in this is the possibility of injury to the spine, brought about by the animal struggling when down. The danger is increased if an attempt be made to hold the feet so that he cannot move them in struggling. Something must give; and he is liable to slip, or break his back. The testicles are usually removed by the ecraseur or the emasculator, or simply cut away after the

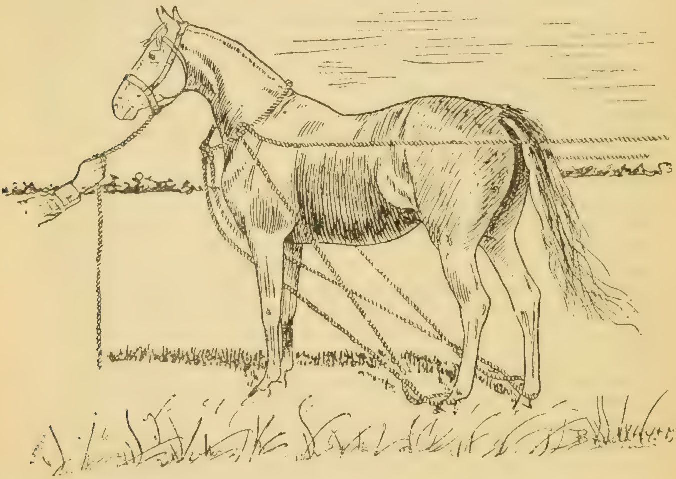

FIG. 57.—COLT PREPARED TO BE THROWN BY SIDE ROPES.
From Galvayne's *Twentieth Century Book on the Horse.*

spermatic arteries are tied. The older methods of removal by cautery or by means of wooden clams, are still much practised. The prevention of complications after castration is best assured by the free use of antiseptics before and after the operation, and by giving the patient a clean box for the first couple of days, and then turning him out to grass, if the season permits. The chief after-danger is from lockjaw (tetanus), due to the entry into the wound of the organism which causes it. It may be successfully combated by the skilful injection of weak solutions of perchloride of mercury, or of antitetanus serum.

The practice of docking horses, or cutting off a portion of the tail with the object of giving a better view of the hind-quarters, is likely to decrease in future. It may linger among Hackney[1] studs, but in many districts it has almost been given up among Clydesdale, though not in Shire, horses, and it is decidedly objectionable when adopted in the case of large carriage horses or animals good enough to become officers' chargers. The pain, though severe for a few seconds, is not the ground upon which extremist humanitarians have really most cause to object to the operation. The removal of the most effective portion of the tail—the weapon which Nature has supplied as a defence against the attacks of flies when the animal is turned out to pasture—is in reality the only important consideration.

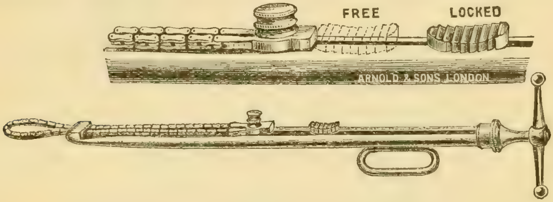

FIG. 58 (*a*).—ECRASEUR (DEWAR'S), NICKELPLATE.

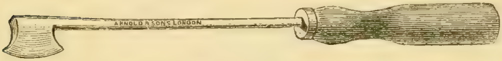

FIG. 58 (*b*).—CASTRATING IRON IN FIXED HANDLE.

Breaking is attended with danger from rearing, kicking, bolting, or sulking on the part of the horse; and carelessness or bad temper on the part of the man. Three special requisites in his case are patience, coolness, and determination. Horses are more easily broken while quite young than when a few years older.

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[1] Undocked roadsters, when touched suddenly with the whip, are liable to throw the tail over the reins, and, getting alarmed, to kick or bolt.

The skin should be kept in good order and free from all parasites, and the hair encouraged to grow by occasional washing with a solution of MacDougall's dipping composition. The animals should be taken up for breaking when they are about two and a half years old. Heavy work strains and stiffens a young horse. The backbone often becomes bent, and stands up "roach-backed," if an animal is made to draw loads that are too heavy. Harrowing or light ploughing is a suitable and safe form of work for a young horse; but carting on the hard road is not so till after he is five years old. Horses ought to be broken to every description of farm work before they are three years old, or earlier if practicable, and during the operation their vision should not be contracted by obscuring their eyes with "blinders." The use of an open head-collar is the best preventive of bolting should derangement of the headgear occur. The first stage is to accustom the animal to the work horses, by feeding it in the stable with them—the harness also being put on to remain while baiting.

Mouthing or **bitting** is done by tying a horse up at repeated short intervals of half an hour at a time with a stout but not too heavy jointed bar-snaffle and smooth bit, and running side-reins fastened back to a surcingle or jockey, but it is far too little practised among draft horses. To cut the mouth with a wrongly constructed, sharp, or thin bit so that it bleeds, makes the repeatedly injured parts hard, and the animal ultimately callous, so that he refuses to answer to the rein. If tied up too tightly, especially with fixed or elastic reins, he is liable to contract the evil habit of "boring"—by thrusting the nose forward and the head down, in an effort to relieve the irritating strain. When the reins are properly adjusted the horse works his head up and down, "bends" to the bit, champs it, and froths at the mouth (both essentials of satisfactory progress), while the natural state of the wicks of the mouth as well as the sensitiveness of the "bars" inside, is preserved in place of being lessened. After bitting has been going on for some days, the reins being gradually tightened and the duration of the lesson extended, the horse should be taken out to an open field, and driven with long reins in front of the breaker. Ropes are then fastened to his collar in the position of draft chains, and pulled by men placed well behind, to accustom the animal to the pressure on the shoulders and the sensation of the chains rubbing against the hind legs, such as occurs while turning in the plough. It should next be yoked to a log with ropes (which are safer than draft chains, should anything go wrong and the legs get entangled), and when accustomed to this treatment, put in double yoke with a steady but active stepping horse. (See Appendix N.)

Breaking to the cart should come afterwards, as it is often a difficult task with nervous animals. The greatest possible care should be taken with all horses, even those reputed to be quiet. A man on each side of the head should hold a long rein to prevent the horse, if startled, from jumping on one or other of them. Two additional men, one on each side, should fasten the attachments, the draft chains being adjusted first. A fifth man lets down the cart behind when the horse is in position. The kicking-strap or a rope substitute should cross over above the root of the tail, each end being made fast to a shaft. This is far more effectual than when the rope is located in the usual place, over the highest point of croup. A long pole placed between the body of the cart and the axle, so that it projects well behind, prevents the animal rearing.

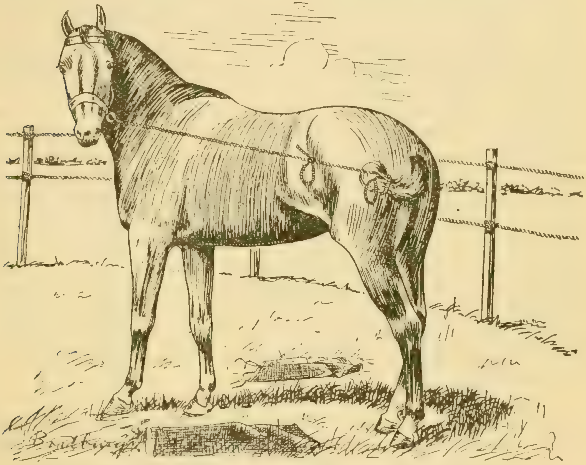

FIG. 59.—A COLT IN THE GALVAYNING POSITION.
From Galvayne's *Twentieth Century Book on the Horse.*

A wild, intractable, or even vicious horse may be subdued by "**Galvayning**"—the Australian method of tying his head with the neck bent round to his tail, and driving him round until he submits to be guided. By adopting this method any horse may be more quickly and safely put through all the various stages of the operation of breaking, but time must be given in any case to allow a young and inexperienced animal to become accustomed to what is required of him and to practise it.

A young horse should be tired, but never fagged by too much or too heavy work, else he may develop bad temper. In a display of this, an animal which urinates repeatedly is usually difficult to overcome. The mouth should not be subjected to sudden checking or tugging. An animal which has been thus abused indicates its recollection of it by trying to move away, and by holding up its head, on the approach of a man. The shoulder and back, under the pressure of the collar and saddle, often become "fired," hot, and painful, especially in warm weather. *Remedy.*—Bathe after work is over with tepid water, gently rub the part dry, and soak it with whisky, or white lotion—1 oz. sugar of lead and 1 oz. sulphate of zinc dissolved in a quart bottle of water. This is the best common lotion for broken or irritated skin. To bathe after work with cold salt water is a common means of hardening the skin of the shoulder to endure the pressure of future work. A paste of fuller's earth plastered over any irritated or superficially injured part acts as a serviceable, stimulating, and healing dressing, provided it be left on till the cure is effected. This debars its use, however, when the injury is the result of the rubbing or pressure of the harness, except when the horse is laid aside from work.

While teething, it is not unusual for a young horse to have a tender mouth and to refuse to eat. If he is off his food through being feverish from work, it is necessary to coax him by giving varieties of food, a little at a time, but at all times new and fresh.

Young horses do better when pastured along with cattle than with sheep, which, like them, are close grazers; but, if more than two run together, or near each other in adjoining fields, they are liable to contract the habit of galloping after other animals grazing beside them, and by exciting and heating them prevent their thriving. Some cattle contract the bad habit of eating the hair from the tails of horses as well as from those of the other members of the herd, and thus reduce the sale value by spoiling their appearance.

When horses have small feet, paring the edges of the hoof now and then, and blistering the coronet, encourage the growth of horn.

Idle horses are liable to rub, bite, and break gates, and escape from their own pastures to do damage to growing crops. A few strands of barbed wire nailed along the upper bars of a gate form a safe and simple preventive of the evil.

The age of horses able to do work may easily be determined by the incisor teeth of the lower jaw, if the animals be not more than eight years old. The molars, except when newly developed, form no guide. A mature horse has forty teeth in equal numbers on

INCISOR TEETH, SHOWING THE AGE OF A HORSE FROM THREE YEARS TO EIGHT YEARS INCLUSIVE.

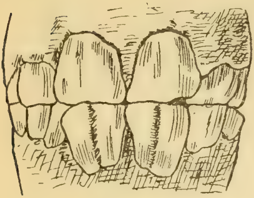

FIG. 60.—THREE-YEAR-OLD.
Front view, four permanent incisors.

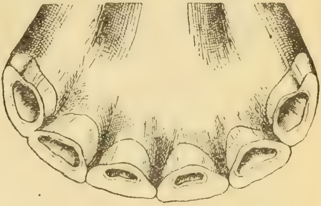

FIG. 63.—SIX-YEAR-OLD.
Lower incisors—centrals worn level.

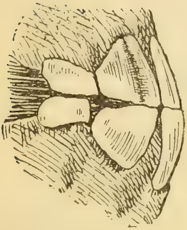

FIG. 61.—FOUR-YEAR-OLD.
Side view, eight permanent incisors.

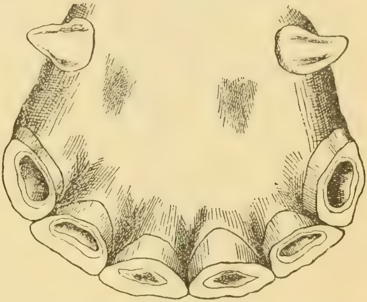

FIG. 64.—SEVEN-YEAR-OLD.
Lower jaw—central and lateral incisors level.

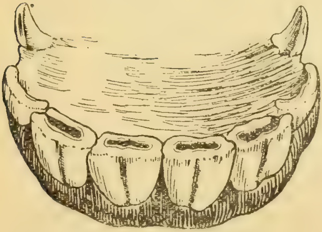

FIG. 62.—FIVE-YEAR-OLD.
A top and front view of a full mouth.

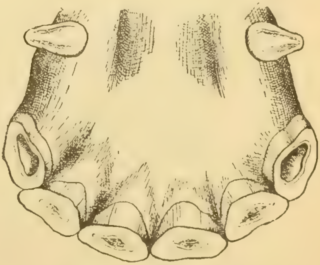

FIG. 65.—EIGHT-YEAR-OLD.
Lower incisors nearly level—laterals slightly cupped.

All reduced from Galvayne's *Twentieth Century Book on the Horse.*

each jaw, four being tushes or canines, which are generally absent in the mare (whose complement is therefore thirty-six teeth).

"*The foal* at birth, or within a few days, has the two central temporary incisors in both jaws, 'milk teeth,' or 'sucking teeth.' In from fourteen to twenty-one days the two middles (upper and lower) appear, and about two months later they become level at the crown with the two centrals. At about the age of six months the corners four appear. When first developed they are always narrower than the centrals and middles. The outside walls of the corner teeth are generally level with those of the middles and centrals when the colt has attained the age of eight months. From this age very little change can be observed in the appearance of these teeth, except that they gradually show more wear, and become smooth at the crown. At one year old the 'cup' (or the infundibulum, *i.e.* funnel) in the crown of the teeth has disappeared from the two centrals; at eighteen months, from the two middles; and when the animal is two years old a similar change is observed in the two corners, so that by this time all the crowns of the lower incisors have become flat and smooth. The temporary incisors appear simultaneously in both jaws." They differ from the straight, inverted-cone shaped permanent teeth in being "semicircular in shape," with a decided "shoulder" where the upper part, "smooth like a finger-nail," merges into the fang.

At *three* years the two "central" permanent incisors or "horse" teeth (Fig. 60) on the lower jaw are up level with the adjoining temporaries, and at *four* years the next pair or "middles" (Fig. 61) are up level with the two permanent centrals, the four below having a well-defined groove running down the centres in front (Fig. 62). At *five* years the two "corner" ones (Fig. 62) have come, making a full mouth; also the four tushes in the male. "Neither the corner incisors in the lower jaw nor any of the upper incisors have any decided groove when they first appear." Between these periods, before the permanent teeth have successively become level, while the fangs of the milk teeth are being absorbed in consecutive order and the permanent teeth are growing, a colt is said to be in turn "two-year-old off," then "rising three," "three off," "rising four," "four off," "rising five."

At *six* years, the hollow or cup on the top of each tooth of the central or first pair is nearly worn out, and at *seven* years the second pair, the middles, is almost levelled—the depression in the first pair having entirely disappeared; at *eight* years all have usually been worn nearly level, and before *nine* is reached "mark of mouth" is lost. Indications of greater age are grey hairs about the head, deep hollows above the eyes, an angular, aged look about the body, and a hollow or saddle-back.—From

Galvayne's *Twentieth Century Book on the Horse*, with acknowledgments.

To make an animal look young, the teeth of old horses are sometimes "bishoped" by low dealers—that is, artificial hollows are made in their crowns, but the deception is easily recognised by the absence of the marginal ring of enamel.

It is claimed for the method described by Galvayne, of studying the changes that take place as the teeth wear, that the age of a horse between ten and thirty can be accurately determined within a margin of one year. He says: "When the lower permanent incisors are first developed they are quite twice as wide across as they are thick through. In a thirty-year-old horse they are just the opposite, namely, twice as thick through as they are wide across. At twenty the thickness through of the two centrals is approximately equal to the width. In the young horse the teeth are nearly perpendicular, but gradually incline until, in the old one, they are at an angle of 30° to 40°, according to age. When first fully developed the lower centrals are usually nearly 3 in. long," but wear with age, as indicated in Fig. 66. "In an old horse the gums become atrophied. In a young animal the gums are full and circular in formation round the teeth."

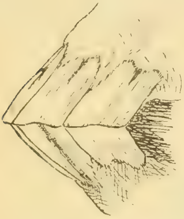

FIG. 66.—Side view of both jaws at nearly twenty years of age.

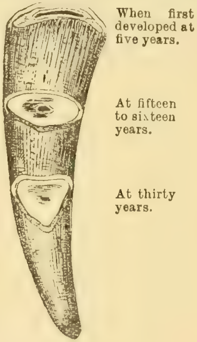
When first developed at five years.
At fifteen to sixteen years.
At thirty years.

FIG. 67.—Sections of an incisor.

Reduced from Galvayne's *Twentieth Century Book on the Horse.*

A valuable auxiliary to the foregoing indications of age is a V-shaped central groove, which in highly fed stallions begins to show at about ten years, or nine years and six months, in each of the corner incisors of the upper jaw. When the teeth have grown and been worn down so that the grooves extend the full length of the tooth, the animal is twenty-one years old.[1]

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[1] For fuller details, Galvayne's work must be consulted.

Professor W. Owen Williams's Patent Horse Measuring Standard was awarded a gold medal by the Highland and Agricultural Society, at Kelso, July 1898. It has since been fitted with rack and pinion adjustment. *The Farmer and Stock Breeder* of 4th July 1898 says:—

> "It possesses a number of ingenious devices which prevent anything like incorrectness or fraud. The upright is fitted with a spirit-level towards the centre, to enable any inequality of the ground being ascertained. It has also running through its entire length a rod which, when the upright is not pressed firmly upon the ground, causes a brass indicator at the top to fall into a horizontal position. There are two spirit-levels in the arm—one near the extreme point, the other at the junction with the upright. A brass and mirror reflector shading the outside spirit-level enables the operator, standing behind the upright, to see when the level is right, and the other level is immediately under his eyes. These levels indicate respectively any swaying of the arm towards or from the horse, and any movement forwards or backwards. The index on the upright is on the inside facing the horse, so that the operator, who stands behind the upright, cannot possibly read the height indicated by the standard until after he has taken it away from the animal."

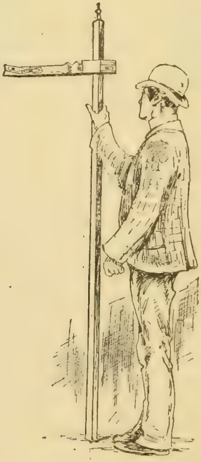

FIG. 68.

CHAPTER XXV

HORSES (*continued*)—THE MANAGEMENT OF FARM HORSES AND THE TREATMENT OF COMMON AILMENTS

Winter Season—Work—Concentrated Food—Fodder—Rations—Water—Litter — Stables — Grooming — Treatment during Summer — Grass Disease—Alterative Medicines—Worms in Horses—Bots—**Common Diseases**—Colic—Monday-morning-evil—Cracked Heels—Mud Fever—Founder—Grease—Mallenders and Sallenders—Treads—Pink Eye—Glanders and Farcy—Strangles—Roaring—Purpura—Broken Wind—Megrims—Eclampsia.

FULL work in the case of farm horses in the country districts lasts for about eight months in the year, and includes spring cultivation and ploughing, the sowing of grain crops and the preparation of root land; as well as harvesting, autumn ploughing and cleaning, and autumn sowing. In many instances, especially in suburban districts, or wherever a large proportion of the farm produce is directly marketed, the busy season extends practically throughout the year. This is becoming more and more the case under increasingly intensive systems of farming, a greater variety of crops, and the extending use of horse-drawn machines to replace hand labour.

The number of working days per annum varies from about 180 to 260, according to the system of farming followed and the nature of the land; the number tending to be greater on the lighter classes of soil, and wherever bulky produce such as hay, straw, or potatoes are marketed; less on the heavier soils, or where the bulky farm produce is largely consumed on the farm.

On normal tillage land, under a four-course or similar rotation, a pair of horses to each 60 acres may be given as an average, the limits of variation being about 40 and 80. On larger farms a proportion of the horses may be replaced by tractors.

Winter food should be given liberally except during periods of complete or nearly complete idleness; then the grain ration must be drastically reduced. Of the various grains and concentrates old oats are universally held in the highest esteem by horsemen. Their special value for horse-feeding has been attributed to the presence in the husk of an alkaloid substance, **avenin**; but is probably due rather to the well-balanced proportions in which the various nutrients occur, and to the physical effect of the husk. The latter keeps the material in an open condition during mastication and prevents the formation of a sodden pasty mass on the stomach. Apart from questions of economy, no end would be served by discussing other feeding stuffs, for no other is so generally useful, neither does it seem specially advantageous to give variety in the diet. But market conditions are generally such that cheaper substitutes are available, which, given care and understanding in their use, can provide an equivalent food value in a safe and satisfactory form. For example, **maize**, which has a considerably higher nutritive value than oats, and is frequently cheaper, can be used to form half or more of the ration, provided it is in the form of rolled or flaked maize, or that it is mixed with some more fibrous and more nitrogenous material; and bran, dried brewers' grains, beans, and barley may each form a considerable proportion. Wheat, and more particularly rye, are considered unsuitable (although when wheat was the cheapest food in the market some farmers used it with caution in horse-feed mixtures). Indian pulses, which are occasionally used in compounding commercial mixed foods, have been known to cause poisoning and should be avoided.

A few points deserve notice. Oats should be bruised. This is especially important for old horses, which have often defective teeth; for three- and four-year-olds, which have difficulty in masticating during the time when they are changing teeth; and for animals that are inclined to bolt their corn. In all such cases, if bruising is omitted, it is common to find whole grains capable of germination being passed in the droppings. Similarly, maize, beans, or any other hard grain should be bruised or broken. In general, the grain should be fed dry, as moistening the food is likely to encourage imperfect mastication. The old elaborate methods of cooking grain with roots and chaff, and feeding the material in the form of a warm slop, have been recognised as a fruitful source of colic, and very rightly abandoned.

The quantity of concentrate, for medium-sized farm horses on ordinary full work, should be equivalent to about 18 lb. per day of oats. In extreme cases, as with exceptionally large animals on continuous hard work, this quantity may be increased by 5 or 6 lb. per day. For the smaller sort of farm horses 14 lb. may be considered about the normal, but much depends on the nature of the work, and more particularly on the speed at which the animals are driven. Whenever horses have been idle more than a day or two, the corn ration should be discontinued or reduced to about half. Overfeeding during such periods is a frequent source of trouble, and, even with skilled drivers, close attention should be devoted to the quantity of grain ration. As the horse has a small stomach, it should be fed at least three times a day, morning, noon, and night, and during busy periods it is an advantage to feed four times if circumstances permit. At morning and midday a full hour, and preferably an hour and a half, should be allowed between feeding and the commencement of work.

Fodder.—Hard, well-cured hay that is free from dust is the ideal fodder. Rye grass, Timothy, and the harder sorts of meadow hay are all good. Clover is less satisfactory, as being generally more dusty, and hence having a bad effect on the "wind," besides being liable, when used over long periods, to cause dust balls in the stomach, which slip when small into the intestine. Moreover, clover hay is too laxative for animals on severe work. Oat straw may be used during the earlier part of the slack winter period, but its use should be discontinued a few weeks before full work is likely to recommence, otherwise the animals will have little reserve condition to fall back upon during the strenuous spring days. The better plan is to feed a mixture of chaffed hay and straw, in which the proportions may be altered according to the amount of work being done. Chaffing is desirable on other grounds, as being less wasteful than the feeding of long fodder, and also as saving the horse part of the time and labour required for mastication. A daily allowance of 18 lb. of hay is sufficient under ordinary circumstances, and during busy periods the quantity should be reduced rather than increased. The object at such times should be to make the ration as a whole more concentrated as well as larger, and this can best be accomplished by a considerable increase in the grain with a smaller decrease in the fodder ration.

The following are **examples of satisfactory winter rations** for average-sized farm horses (of say 15 cwts. live-weight):—

On Average Work.	On Hard Work.	On Light and Irregular Work.
6 lb. Oats.	10 lb. Oats.	5 lb. Oats.
6 lb. Maize.	8 lb. Maize.	5 lb. Bran.
4 lb. Bran.	2 lb. Beans.	10 lb. Oat straw.
18 lb. Hay.	16 lb. Hay.	10 lb. Hay.

It is almost unnecessary to say that all feeding stuffs should be sound—*i.e.*, free from mould or mustiness, or other causes of damage. Heated oats, for example, besides being distasteful, are liable to cause kidney troubles. New oats are not satisfactory for horses, being liable to bring on grease, and should not be used till two or three months after harvest, or till the new year has begun.

Certain other feeding stuffs may be usefully employed at times to supplement the ordinary ration. **Crushed linseed,**

for example, is very useful for thin horses, especially young animals in their first year or two of work, or again for those that are nearing the end of their useful life. Linseed gives a sleek appearance to the coat and is rather freely used in conditioning horses for sale. The quantity should be restricted to 2 or 3 lb. per day. **Molasses** (or one or other of the commercial sugar meals) is useful in the case of shy feeders, particularly during busy seasons. Such animals, coming in overtired, might refuse an ordinary feed, but can frequently be induced to eat the sweetened ration. Moreover, sugar is the most rapidly available of all nutrients and affords quick relief to the fatigued muscles. **Linseed oil** (2 oz.) poured over a dry feed acts as a relish to hard-worked horses, and is also an easily assimilated and valuable food supplement. It is of course difficult to withdraw such materials when the necessity for them is past. **Potatoes**, if sound and thoroughly cooked, may be used, provided some sufficiently nitrogenous material, such as beans, be given with them. Uncooked potatoes are liable to cause colic, and old sprouted tubers, whether cooked or raw, have on several occasions caused deadly poisoning, and should never be given to horses. In many districts swedes or carrots, up to 10 or 20 lb., are regularly fed to horses as a last meal at night. They are greatly relished by animals on dry feeding, and are probably a useful addition from the point of view of maintaining the general health. Any considerable quantity of roots would cause looseness of the bowels. Another custom, even more widespread and certainly based on sound principles, is that of feeding a **bran-mash** in place of the grain ration on Saturday night. Two to four drams of saltpetre may be usefully added. This has the effect of preventing stocking of the legs in the absence of exercise, and is most necessary when the animals are being hard worked and heavily fed.

Regular and ample watering is of first importance. Water should be pure, fresh, and not too hard. It should be allowed *ad libitum* at least three times a day before, or at least not immediately after, food. The sole exception should be made in the case of an animal that is overheated, which must not be allowed to drink too freely if the water is very cold. In such cases the water should be warmed to about 55°, or the quantity should be restricted or given towards the end of the horse's activities. To delay watering till the animal has cooled, and then give cold water, increases the danger.

Litter.—12 or 14 lb. per day of wheat or oat straw is a satisfactory allowance of litter. Barley straw, if it contains awns, is not so good, as the latter are liable to irritate the tender parts of the skin. Moss litter is generally cheaper than straw, and goes farther. It must not, however, be allowed to become wet and stale, as the ammonia that is then produced is liable to cause injury to the hoofs, and sores about the heels. Wet litter of any description, or accumulated dung, is the main cause of thrush.

The stable should be roomy, at least 18 ft. wide, not less than 9 ft. high at the walls, with abundant light and efficient ventilation. The floor, whether of cement, brick, or stone setts, should be laid on a substantial basis of stones and concrete to ensure strength, should be completely impervious to urine, and must be so finished that the horses do not slip. Stalls should be 6 ft. wide, or up to 6 ft. 6 in. for large horses. As regards fittings—overhead racks are objectionable, as dust and dirt from them are very liable to get into the horses' eyes. A fireclay feeding trough with a close manger for chaffed hay, etc., make the best feeding fixtures. The manger should be 3 ft. to 3 ft. 3 in. above the floor. It is an advantage to have water laid on to each stall, but in this case the water-pots should be covered with a spring cover. Such an arrangement, introduced some years ago by A. C. Mundt, is illustrated in Fig. 69. (See also Appendix O.)

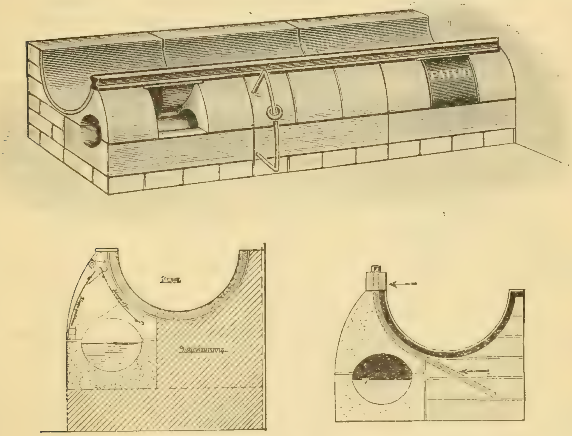

FIG. 69.—MUNDT HYGIENIC WATER-SUPPLY FITTINGS.

The thorough grooming of farm horses is too little practised. On coming in from work they should be well rubbed down with dry straw and, as soon as the hair has dried, groomed to rid the coats of dust, which is to a large extent the remains of dried-up sweat. "A thorough grooming is as good as an extra feed." To facilitate grooming, and to add to the horse's comfort, the hair on the under part of the body and the limbs down to the knees and hocks may with advantage be clipped. The extremities and the back should retain their natural covering. Horses thrive best when thus relieved of surplus hair; it is no uncommon sight to see an unclipped horse which has been heated in the yoke, still wet on the following morning. This is an unhealthy state of matters.

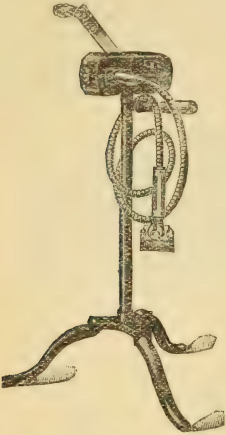

FIG. 70.—HORSE CLIPPERS (ARNOLD'S).

Treatment during Summer. — If horses are too highly fed while not doing full work, they become overfat and "stale," and are afterwards much more difficult to maintain in good working condition. Along with green food in its season, 7 lb. of oats per day in two feeds, is generally enough. When horses are at hard work, this amount may be doubled. Some do not eat corn freely when on grass; the teeth seem to be "set on edge," like those of a human being by eating unripe apples.

There are two **common systems of feeding** during summer. The **first** is "soiling," involving the cutting and carrying of green forage to horses turned loose when not at work in large open yards with shelter-sheds. Clover, grass, vetches, or "mashlum" (grain mixed with tares) are all useful foods in their season, so long as care is taken to see that the material is not fed wet or allowed to become heated. Soiling is an economical plan if food be not plentiful, or where land cannot be spared for pasture, but it requires additional labour to that necessary when horses are grazed.

The **second** system is the easier and commoner one of turning horses out to grass at night or at other times when not at work. In the north the practice of turning out at night must be confined to a period of about three months. The disadvantage of the grazing system is that horses, especially if young, are liable to gallop, cut up the grass, and cast their shoes; besides there is danger of colds, pneumonia, and founder, if the animals are carelessly turned out when heated from the yoke.

Grass Disease.—It has long been known that grasses, especially rye grass, at a certain state of ripeness or overripeness, occasion among horses nervous troubles (staggering, weakness, vertigo) called **grass staggers**. A change of pasture and a dose of physic usually suffice to put such cases right. Some alkaloidal poison was supposed to be developed in the grasses and to set up the malady. In Forfarshire and adjoining counties a much graver form of staggers has appeared among agricultural horses at grass, and is named "grass disease." Recurring yearly it has caused many fatalities. It is generally prevalent only in late spring and early summer. It is thought to be of microbic origin, and similar to, if not identical with, **Borna** disease, an enzootic or epizootic inflammation of the brain and spinal cord and their coverings, which has for years spread over Germany. Various micro-organisms have been described as responsible for the malady, but the virus is probably a filtrable one and ultra-microscopic. Inflammatory changes in the brain substance, particularly in the anterior parts (the olfactory lobe), in the spinal cord, and in the meninges,[1] have been observed. It has been suggested that the virus gains access by inhalation and passes from the nasal mucous membrane by way of its lymphatics connecting with the olfactory lobe of the brain. At post-mortems no naked-eye changes are discoverable. The intestines (the cæcum especially) show impaction, due to the brain changes causing loss of function in the nerves of the alimentary tract. The symptoms are at first related to digestive disturbances—salivation, colic, constipation, yawning; also sweating, muscular tremors, difficulty in swallowing, rapid emaciation—the last being a characteristic symptom. Later there is dulness, depression, pressing the head against some object, weakness, blundering gait, falls, vertigo, and finally paralysis and death. The course of the disease varies. Acute cases may die in a few days; subacute, in two or three weeks; and chronic cases in a month or two. Medicines are of little avail, and serum treatment is only in the experimental stage. MacLaren, M.R.C.V.S., of Brechin, recommends mowing the grasses to prevent them seeding. (See Appendix C I.)

Alterative medicines are often required, along with careful feeding, after horses return to the stable in the autumn. The physical system is liable to go down at this season, probably with the change of coat. Two drams of desiccated and powdered sulphate of iron mixed in a full feed of corn once or twice a day is a good tonic. Tonics are better than physic in the correction of ordinary derangements, unless **parasitic worms** have to be cleared away.

WORMS IN HORSES

Horses that have grazed during the summer invariably pick up internal parasites, and a course of treatment, on their return to the stable and dry food, is often necessary. To destroy round or thread worms in the stomach or intestines, a horse, after fasting for twelve hours, should have a powder containing 1 dram santonine, 2 drams areca nut, and 2 drams nux vomica—to be followed, after preparation for twenty-four hours with cold bran mashes, by an **aloes ball** of from 6 to 8 drams according to the size of the animal.

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[1] Three membranes protecting the cerebro-spinal axis.

"**Ascaris megalocephalus.**—The commonest nematode worm of the horse, length 6 to 15 in. The intestine is their natural habitat, and in great numbers they are a common cause of colic, but occasionally they make their way to the stomach and then may cause mad staggers.

"*Treatment.*—A dose of aloes or a pint of linseed oil with 2 to 3 oz. of turpentine will remove them."

"**Bots** are the larval form of the fly, *Gastrophilus equi.* The flies lay their eggs on the hair of the mane, neck, shoulders, and the fore legs; the eggs hatch in about a week. The horses lick themselves or their companions, and in this way the larvæ find their way into the stomach of the horse, where they usually attach themselves to the cuticular portion, there to remain during the autumn and winter, and pass out with the fæces in spring. On the cuticle they do little harm, but occasionally they extend to the vilous portion, and, interfering with digestion, cause colic and loss of condition, and they have been known to perforate the wall of the stomach and cause death. They sometimes adhere to the lower reaches of the gullet and interfere with the passage of water and food to the stomach. Bots are difficult to dislodge, as they bury their mouths in the coat of the stomach.

"*Treatment.*—Carbolic acid 1 dram, glycerine ½ oz., in a pint of warm water, followed shortly by a pint of linseed oil and 2 oz. of turpentine, may be successful. The solution of iodine is sometimes effective.

"*Preventive measures* are to smear horses turned to grass about July or September with a dressing similar to that recommended to protect cattle from the warble fly, viz., 1 gallon train oil, 1 pint spirits of tar, and 1 lb. flowers of sulphur."

"**Oxyurus curvula** is a round worm which infests the rectum of the horse, causing irritation and consequent rubbing of the tail. Underneath the tail of affected horses a collection of eggs in a yellow mass will be found.

"*Treatment.*—Give an injection of infusion of quassia, or turpentine and milk 1 oz. to the pint. As a preventative, keep the dock and anus well sponged with disinfectant fluid."

"**Strongylus tetracanthus** is a small sucking worm about ½ to 1½ in. long, but with a head especially armed for holding on to the walls of the intestine. It gives rise to colic and diarrhœa, and induces emaciation and anæmia. It is passed out with the fæces, gorged and red with blood.

"*Treatment.*—Give medicines of a vermifuge character: 1 teaspoonful of sulphate of iron; powdered gentian, salt, and flowers of sulphur, each a tablespoonful in the manger food; and at the end of a week a pint of linseed oil with 2 oz. of turpentine."

Tapeworm is difficult to dislodge, but it is only rarely a cause of inconvenience to its equine host. If its presence is suspected it may succumb to a course of 1-dram doses of desiccated sulphate of iron powder, given daily for a month, in oats or bran; with, once a week, 2 oz. of turpentine and 2 drams of extract of male-fern in dry oatmeal or in a pint of raw linseed oil. At times the bran preparation alone is sufficient to restore a horse to its natural state of health. One of the safest, most simple and effective purgative drenches for a horse, is one or two quarts of fresh yeast or barm.

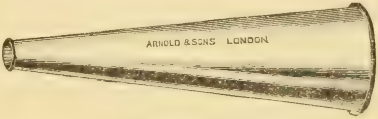

FIG. 71.—TIN DRENCHING HORN.

"**Colic** is most commonly caused by:—(1) Faulty feeding; (2) sudden change of food; (3) long fasts followed by heavy meals; (4) long draughts of cold water when over-heated, especially after beginning to cool down; (5) excessive amounts of green food, especially when first given in spring following the hard keep of the winter months; (6) constipation; (7) internal parasites; (8) twisted or invaginated gut; (9) calculi; and (10) tumours. The first seven causes produce either simple or flatulent colic, which latter for safety requires the immediate attention of a veterinary surgeon. Attacks due to the latter three are quite beyond the treatment of the stock-owner. *The symptoms* of **simple spasmodic colic** are extremely sudden in their onset: the animal may be at work, when he will stop without warning, paw the ground, shake himself, and try to lie down; or, in the stable, he may be quietly eating, when he suddenly stops, paws the ground, whisks his tail, and looks round towards the abdomen. These signs increase in proportion to the pain, which may become so acute that he throws himself down, groans, rolls on his back, jumps up and stands quietly for a few moments, and then rolls again. The symptoms may keep recurring at longer or shorter intervals. An attack may pass off in fifteen minutes, or last as many hours. If it lasts longer than this, there is reason to fear one or other of the more serious causes of colic. The animal sweats profusely, the pulse is full and hard, the temperature is raised slightly, and the distribution of the body temperature is uneven.

"**Curable colic** may be confounded with the more serious ailment of **Enteritis** (inflammation of the intestines); although in colic the animal generally throws himself violently about, while in enteritis he lies carefully down; in the former the pain is intermittent, the eye bright and natural, and the temperature only raised one or two degrees; in the latter the pain is continuous, the eye dull and anxious, the temperature raised at least 3° or 4°; and pressure on the abdomen gives relief in colic, but in enteritis it causes pain. The *treatment* must be prompt to relieve the pain, and the best way is by subcutaneous injection of morphia, 5 to 8 grains of the hydrochlorate in an 8 per cent. solution, administered by a veterinary surgeon; but, failing this, give a draught of linseed oil and turpentine; or chlorodyne 1 oz., and sweet nitre 2 oz., in warm water, followed by a pint of linseed oil. Repeat the draught in two hours if the pain is not relieved. If fæces are not passed, the rectum should be manually explored and back-raked, and an enema of tepid water given to promote the action of the bowels. The belly, ears, and legs should be well and continuously rubbed," the animal being sheeted and allowed to lie down.

Flatulent colic is due to the fermentation of food and consequent generation of gases in the stomach and intestines, often the result of drinking water after a feed of green clover, vetches, or sainfoin. This is a more serious condition than simple colic, owing to the danger of rupture of the distended parts or of suffocation, through pressure on the diaphragm preventing the proper functioning of the heart and lungs. *Symptoms.*—"The abdomen is blown out (hoven), particularly in the right flank, the pain is continuous, and the breathing rapid—the nostrils being greatly dilated: the animal lies down gently, gas passes by the rectum, and the body is covered by cold sweats, the extremities are cold, and there are signs of great distress. *Treatment.*—Promote the free escape of gas by using enemas, and give a draught of linseed oil 1 pint, and 2 oz. of turpentine. If this fails to counteract the formation of gases and so give relief, the abdomen must be punctured, preferably in the right flank (to get into the cæcum or large intestine), at a point equidistant from the point of the haunch, the edge of the last rib, and the ends of the lumbar processes. The hair should be first clipped and the part washed with a disinfectant (as Jeyes' fluid), then an incision made through the skin with a sharp knife or lance, and lastly, the puncture, in a downward and forward direction, with a special trocar and cannula previously disinfected, and the gas allowed to escape *slowly*. When the cannula is removed the wound should be closed with some form of plaster."

Lymphangitis, Weed, or Monday-morning-evil is an inflammation affecting the lymphatic glands and vessels of a limb, usually one of the hind limbs. Coarse, round-boned, underbred, heavy horses are much more liable to attack than the light-legged breeds. The commonest cause of weed is the keeping in the stable, without exercise, of highly fed animals which have been accustomed to regular work, and continuing to feed them as if they were working. With cessation of work the corn should be reduced, and a bran mash with 2 drams of nitrate of potash given. When horses are first turned out to grass in spring, "weed" may show itself. "*The symptoms* are rigors, trembling, quick breathing, rise in temperature, and great lameness; the leg is swollen, may be held off the ground, and is tender when touched, particularly marked at the seat of the lymphatic glands inside the thigh in the hind limb and inside the arm in the fore extremity, the horse walking with a "stringhalty" action. *Treatment.*—Give a moderate dose of physic (aloes), and an anodyne draught of 2 oz. of laudanum and 2 oz. of sweet spirits of nitre. Foment the leg with hot water to relieve the pain, but, to avoid the formation of an abscess in the groin, do not continue to foment; and dress the leg with an anodyne embrocation—soap liniment 2 oz., laudanum 2 oz., and water 1 pint."

Cracked heel is primarily an inflammation of the superficial layers of the delicate skin in the hollow of the heel. It extends to the deeper structures, and produces lameness. White heels are more liable to suffer than black ones. The causes are too frequent washing of horses' legs, especially in cold weather; standing in damp and filthy stables; and high feeding. *Treatment.*—"Give a dose of physic, and dress the heels with zinc ointment to which iodoform has been added in the proportion of 1 to 8; or Goulard's solution 1 part, and glycerine 4 parts."

Mud fever is a more aggravated condition akin to that of cracked heel, and arises from the same causes; but generally from the lazy groom's habit of washing the legs, in place of permitting them to dry and then cleaning them by brushing. If washing be practised, the legs should be thoroughly dried, or the animal made to walk a mile or two before going into the stable, to quicken the circulation and prevent the chilling of the skin through the rapid evaporation of water. "The cutaneous inflammation then extends up the legs on the inside of the hocks and thighs and on to the body, and the skin is red and covered with small pimples. This condition is at times the result of the irritating effects of certain soils. In some parts of Great Britain it is common; in others it is almost unknown." If neglected, the irritation, which begins usually about the heels, may spread and make it necessary to keep the animal out of work for weeks. Some horses suffer seriously from the disease and fall away in condition, while others seem little affected. The *treatment* is the same as that given above for cracked heels, but the lotion is preferable to the ointment. One of the best preventives is to leave the hair of the limbs unclipped, as a protection to the extremities, which are most liable to suffer from cold.

Fever in the feet, founder, or laminitis (p. 572), is an inflammation of the sensitive laminæ and all the vascular structures of the feet. In nine cases out of ten it is primarily due to disordered internal organs—bowels or womb. Horses with heavy bodies and small legs and feet; or with flat, open feet; or with a hereditary tendency, are predisposed to the disease.

The *inciting causes* are—(1) overfeeding with a stimulating diet while giving insufficient exercise; (2) driving a horse a long journey on hard roads after prolonged rest in the stable; (3) exposing a horse to cold; or giving him flour and water or meal and water without the starch having been burst by boiling; or, when overheated, an excessive draught of cold water; (4) animals obtaining by accident, or by being carelessly fed, an excess of such foods as Indian corn (by far the worst), wheat, green oats, or green oat-straw. "Laminitis is sometimes a sequel to parturition. Travelling stallions are particularly subject to the disease. They are made sleek and often too fat, to catch the public eye, and they have to walk long distances on hard roads, or stand in horse-boxes during long railway journeys. *Symptoms.*—The first indications are those of a chill, shivering, and slight rise of temperature, then apparent stiffness of the loins; the surface of the body cold; temperature up to 104° or 105°; the horse refuses to back, or does so gingerly; and the feet are hot. The fore feet are the most commonly affected, and the horse stands with the hind feet well underneath him, in order to relieve the fore feet from his weight. If all four feet are affected, he stands with them gathered together and the back roached. The appetite is usually totally lost. Some animals persistently stand; others equally persistently lie, to their undoubted relief. The disease runs its course in about a week. *Treatment.*—Remove the shoes and poultice the feet with bran poultices; give 2 drams of nitrate of potash in the drinking water. Of febrifuges, the best in this disease is Fleming's tincture of aconite, in 5 to 10-drop doses, or, even more reliable, P. B. tincture of aconite in 20 to 30-drop doses. Failing the aconite, laudanum as an anodyne may be used in 2-oz. doses, at intervals of four hours. A dose of physic (5 or 6 drams of aloes, or 20 to 30 oz. of raw linseed oil) should be given, at the onset of the malady, provided there are no signs of diarrhœa—in that case a purgative increases the irritation and aggravates the attack. The poultices should be frequently changed, and, if the animal does not lie down, he should be put down, to relieve the pressure on the feet." In a few days the patient must be exercised on soft ground, and a pair of thin-heeled box shoes should be put on, and exercise repeated twice a day.

Grease is an inflammation of the skin of the heel, with an increased discharge from the local glands of sebaceous or fatty matter (hence the name). Underbred, heavy horses (especially those with hard, curly hair on their legs) are more liable to it than light ones, and the hind legs are more commonly affected than the fore.

" *The essential cause* is an unhealthy condition of the blood, due to overfeeding with corn, and insufficient exercise. Predisposition to the disease is distinctly hereditary, and it is undoubtedly a mistake to breed from animals that have suffered from this affection. It is a frequent subject of remark among breeders that certain families of cart horses are liable to develop grease. Cracked heels that have been neglected are liable to degenerate into this more intractable disease. In chronic and aggravated cases, the papillæ of the skin increase, forming large wart-like growths, termed 'grapes.' *Treatment.*—Give a dose of physic, and lower the diet. Clip the hair from the heels, and foment two or three times daily, and, when the inflammation has subsided, apply astringent lotions, as chloride of zinc 40 grs. to 1 pint of water; Goulard's solution, *i.e.*, 1 oz. to 4 oz. of glycerine; or 1 oz. of sulphate of copper to 4 of boiling water, which must be allowed to cool. In skin diseases a frequent change of dressing will often effect a cure when any one of them would fail. When **grapes** are present they must be removed by the hot iron, the healthy portion of the heel being carefully protected by a cold iron while the hot one is being used. A run out at grass purifies the blood and aids in the cure of grease."

Mallenders and **sallenders** are forms of eczema involving the deep layers of the skin in the flexures of the hock and knee-joints, most common in heavy horses, and particularly in heavy stallions. "The first signs are roughness of the hair and scurfiness of the skin; then deep cracks appear right through the skin. This condition, if not taken early, is difficult to cure. The diet should be lowered, a dose of physic given, the part well washed with soap and water, and iodine ointment or oleate of mercury ointment applied."

Treads.—A tread is a wound of the coronet inflicted by the opposite foot, generally a hind foot. It is frequently due to one foot crossing the other in quick turning, on slippery roads or in backing, but again it may arise when a horse scratches violently one leg with the shoe of the opposite foot. The more the horse scratches the more frequent and the more energetic is the scrubbing. In cold weather very serious treads are seen, due to infection of the wounded skin (its vitality lowered by cold) by the bacillus of necrosis. When salt was used to melt the snow on the tram lines, severe treads were of a very frequent occurrence, often incapacitating the patients for weeks. The horse's gait is characteristic. The foot is planted firmly on the ground, but is lifted in a manner that suggests stringhalt. The middle of the coronet is swollen and tender to the touch. After some days the swollen piece of skin suppurates and sloughs off, leaving a large open wound. *Treatment* consists in applying, and maintaining in position by a calico bandage, a large pad of cotton-wool soaked in solution of perchloride of mercury (1-1000). When the wound is granulating freely employ a dusting powder of boracic acid and iodoform. The horse should be shod with a thin heeled shoe when ready for work. In all serious wounds it is an excellent practice to administer at once a dose of tetanus antitoxin. Some horse-owning firms even use it in cases of prick in shoeing and of gathered nail.

Pink eye is a specific infectious disease like influenza, spreading from horse to horse, but not to other animals. It varies much in its acuteness. Horses of all ages are attacked, but those badly housed and badly fed suffer most. "*The common symptoms* are—extreme prostration and muscular debility, accompanied with high fever and irregularity of external temperature; and usually there is a dry, hard cough. The mucous membrane of the eye has a yellowish-red colour, hence the name 'pink eye'; the legs sometimes swell, and pit on pressure; and the temperature rises to 103° or even 105°, rarely higher. In complicated cases, the liver and chest may be involved. *Treatment.*—This ailment is one that has to run its course, and careful nursing and good hygienic surroundings are the main factors that bring about a successful termination. Place the patient in a light, airy, loose-box, clothe and bandage; frequently remove the bandages, and hand-rub the legs to improve the circulation. It is well to encourage the animal to drink freely, and to give in the drinking water 2 teaspoonfuls of potassium chlorate twice daily, and 2 oz. of Epsom salts to keep the bowels in proper order; a purgative must on no account be used. As a febrifuge, acetate of ammonia and sweet spirits of nitre, 2 oz. of each, in water, may be given three or four times in twenty-four hours. If the appetite be lost for some time, milk mixed with an equal volume of water will keep the strength up. During convalescence give tonics, sulphate of iron, and powdered gentian—a teaspoonful of each in manger food."

Glanders is an incurable disease of the horse due to the *Bacillus mallei*. There are two forms—acute and chronic—the latter being the one usually seen.

Symptoms.—"In the early stages of **chronic glanders** there may be only an unthrifty appearance, which is followed by poor and emaciated condition, and a scanty nasal discharge, usually unilateral or from one nostril, of a watery fluid which afterwards becomes like the white of an egg, viscid and sticky. On the mucous membrane of the nostrils typical ulcers form, with hollow centre and raised edges, and the submaxillary glands swell, adhere to the inside of the jaw on the affected side, and become hard as the disease advances. The varying temperature is slightly above normal, which is 100·5° F. The disease can be transmitted to mice and rats by inoculation, and to feline animals, as lions and tigers, by feeding them on the flesh of glandered horses. It is fatal to man. Grooms who sleep in stable lofts may contract it by infection; or they may be inoculated by the nasal discharge getting into abrasions of the skin or on to the mucous membrane. An affected horse coughing or sneezing in a man's face is most dangerous. Cattle are immune, and sheep and pigs are practically safe. The chronic form of glanders may exist in a horse for years, and as 'occult glanders' be communicated to his stable companions although he is apparently healthy. The **acute form**, the only one known in the donkey, is quickly fatal in the horse. Its period of incubation is from three to seven days, and it runs its course in a very short time. All animals affected with this form of glanders should be immediately destroyed." In the days of stage-coaches the disease was very generally distributed over the United Kingdom. Now, it is chiefly confined to the cities of London, Liverpool, and Glasgow, and, although it increased in the first few years after it was scheduled under the Diseases of Animals Act, it has now been all but stamped out. In 1895 there were 487 reported outbreaks; within ten years the number rose to 2304, but fell to 1066 in 1906, 23 in 1919, and 4 in 1922. Predisposing causes to infection are the poor condition induced in a horse by over-working and under-feeding, and keeping in dark, badly-ventilated or underground ill-drained stables. The *mallein test* is a sure means of diagnosis, even more generally reliable than the tuberculin test in cattle; but it is unfortunately used by unscrupulous owners of large studs to identify affected horses, that are then passed on to unsuspecting purchasers and so carry the disease to new centres. By order of the Board of Agriculture, veterinary surgeons must report all outbreaks of glanders.

Farcy, the cutaneous form of the disease, also occurs in an acute as well as in a chronic form. "Small, hard, painful tumours break out on the surface of the body, usually on the insides of the thighs and forearms, or on the neck. In the acute form there is fever and swelling of the affected limbs." When the swellings or buds point and break, discharging purulent matter, they form ulcers and do not tend to heal. The animal should be slaughtered.

Strangles is an infectious and contagious disease of the horse, in the course of which there is inflammation of the lining membrane of the nose and suppuration of the submaxillary lymphatic glands. The malady is due to a microbe, the *Streptococcus equi*. It was formerly thought that this was a complaint through which all young horses had to pass; the opinion was also held that glanders might be a sequel to strangles. It is now known that these views are erroneous. The disease as a general rule affects only young horses, and one attack may be said to give permanent immunity. If the disease is seen in old horses they have probably escaped the malady when young.

Strangles is a mild disease for the most part, still fatalities are not altogether uncommon, and there are several serious sequels—roaring, purpura, etc. Strangles is more prevalent in spring than at any other season, and may occur year after year in some breeding establishments. It is probable that the germ causing the disease may live in the soil and propagate there. Nasal discharge or pus from a patient conveyed on fodder, etc., to the nose of a young equine is perhaps the normal source of infection. Lodged on the nasal mucous membrane the germ multiplies and sets up inflammation there. Later it reaches the submaxillary lymphatic gland, and produces suppuration and abscesses in this and in neighbouring glands. This is the typical course.

"Bastard strangles" is the term applied to the atypical form of the malady in which lymphatic glands in any part of the body may be attacked; or the subcutaneous tissue of the head and neck may undergo suppuration, accompanied often by lymphangitis and a whole series of small abscesses along the course of superficial lymphatics. Strangle abscesses sometimes develop with fatal results, in the lymphatic glands at the root of the trachea, and in those of the mesentery. The brain, liver, lungs, spleen, and kidneys are occasionally affected. It has often been observed that, when a number of horses in a stud are attacked by strangles, a certain number of the patients have merely nasal discharge and cough and febrile symptoms, but no suppuration of the lymphatic glands.

Symptoms.—After an incubation period of a few days the animal is dull, goes off its food, has a cough and a discharge from the nose which, at first watery, soon becomes purulent; the lymphatic glands between the jaws are swollen and tender, and later get tense and very painful, and soon fluctuating points may be felt which if left to themselves ulcerate through the skin and allow the escape of a thick, creamy pus. A large swelling may form below the ear, due to the lymphatic glands on the parotid suppurating, or to a purulent collection in the guttural pouch.

Treatment.—If the disease breaks out in a number of colts at grass, they may be left in the field if the weather is mild, but should be carefully watched. Any animal ceasing to feed and separating itself from the others, or showing symptoms of respiratory or other trouble, should be put into a box or strawyard and receive the necessary treatment. In cold weather the animals should be placed in a shed or a strawyard having a hovel for them to run in, and a waggon load of straw or a big tarpaulin may be used as shelter from the wind. When the abscess in the gland is "ripe," it should be opened and the cavity washed out with an antiseptic. Should the abscess burst inwardly, there is danger of choking and blood-poisoning. If the throat is sore, swallowing being difficult, an electuary of chlorate of potash and honey or glycerine may be smeared on the tongue.

Strangles in old horses is usually of a mild nature, and often is represented by an abscess of the submaxillary gland which develops without the patient showing any symptoms of illness.

Mashes of stewed linseed and bran and good hay can be offered. Hay tea can be given if food is refused. On no account should an animal with a sore throat be drenched with gruel, milk, eggs, etc. At times through œdema of the larynx the breathing becomes greatly embarrassed, and it is necessary to put a tube in the throat (tracheotomy).

A serum has been discovered by Professor Dassmoille of the Pasteur Institute which, injected into horses (young or old), renders them immune to the malady.

Roaring is a common sequel to strangles, and is due to paralysis of the left recurrent laryngeal nerve; as a result of which the muscle that opens the glottis (or valve in the larynx) wastes, and there is narrowing of this orifice and consequently a difficult and noisy inspiration which, however, is only apparent when the animal is exercised so as to induce forced respiration.

To test a horse for roaring, he is either lunged or galloped under saddle, or put to draw a heavy load, when, if he is affected, he shows distress, the nostrils dilate, and a shrill harsh noise is emitted.

Treatment of Roaring.—Drugs are useless for this condition. When the disease is advanced so that the patient is distressed at work, a tracheotomy tube can be inserted. Many good race-horses and hunters (animals often the subjects of the complaint) are successful performers when "tubed."

In recent years an operation is frequently resorted to for the relief of roarers. This consists in opening the larynx and stripping off the mucous membrane of the pouch behind the vocal cord, so that the latter adheres to the side of the larynx and thus leaves the glottis or chink open. The operation is often successful, but it has not been unattended by failures.

In **purpura**, another sequel to strangles, swellings develop in the limbs, on the floor of the belly, and about the face, together with little hæmorrhages on the mucous membrane of the nose and eyes. The swellings are painless, and are due to exudation of serum from the blood-vessels. This complication of strangles is frequently fatal. *Treatment* consists in giving intratracheal or intravenous injections of a 1 per cent. solution of iodine in iodide of potassium, and the administration of turpentine, chlorate of potash, iron preparations, and eggs.

Broken Wind.—This complaint is found mainly in old horses, and mostly in common bred animals—cobs and ponies being particularly liable.

The cause of broken wind is obscure. Dietetic errors are certainly responsible for many cases. Feeding on large quantities of inferior or musty hay is likely to give rise to it, and in any case such food greatly aggravates the disease. **Post-mortem**, the lungs of a broken-winded horse are found to be emphysematous—dilatation and thinning of the air cells—so that expiration is attended with difficulty; this expresses itself in the living animal by a double movement and peculiar heaving of the flanks. A cough of distinctive character is always present, or may be easily induced by pressure on the trachea. The disease is progressive and ends in making the subject of it useless for work. Dishonest horse dealers make use of various agents to suppress the cough and the heaving flanks in order to effect a sale. Oil, bacon fat, butter, leaden shot and many drugs, mostly sedatives (opium, aconite, tartar emetic, belladonna), are thus employed, and quite frequently successfully "set the wind"; expert horse buyers and even veterinary surgeons have been deceived thus.

The *treatment* of broken wind is mainly dietetic. The hay should be limited in quantity and of good quality, or good oat straw may be substituted for hay. It should be given chaffed and moistened with linseed tea, the rest of the ration to consist of crushed oats. An alkaline—bicarbonate of soda in half-ounce doses—may be given two or three times a week. The patient should be bedded with sawdust to prevent his eating the litter. Silage may take the place of dry fodder with advantage, or chaffed or bruised gorse or whins, where they are cultivated, as in some parts of Ireland and South Wales.

Megrims.—In this affection the patients (cart horses mostly) appear to become dizzy, and the sense of equilibrium is lost. Holding the head high and to one side, the horse reels and, if not quickly supported, falls. The attack is never observed in the stable, and usually comes on while the animal is going uphill. The cause of megrims is usually some disturbance of circulation in the brain. A tightly-fitting collar compressing the jugular veins will induce an attack in an animal predisposed to it. When a seizure takes place the horse should be caught by the bridle, and immediately turned downhill or backed out of the collar. Afterwards bleeding from the jugular should be practised and a dose of physic given.

Eclampsia.—This term is applied to a condition in which the patient shows convulsions and loss of consciousness. It is mostly observed in young animals, and is often ascribed to the effects of the erupting teeth on the mucous membrane of the mouth. Probably, however, intestinal worms, or catarrh of the stomach and intestines from indigestion, may be the cause.

The **treatment** consists in removing the cause. Worm medicines, alkalies, etc., and at the time of the seizure chloral hydrate may be used.

A form of eclampsia is met with in adult animals, particularly after parturition, in which convulsions are present, but there is no loss of consciousness. This malady is mostly observed in the bitch, but also occurs in the mare, cow, and sow. The attack comes on soon after parturition and the principal symptoms shown are muscular spasms and twitchings, grinding of the teeth, rotation of the eyeballs, bellowing (cow), or neighing (mare), and in all patients rapid breathing. The **treatment** to be adopted is the administration of large doses of chloral, or hypodermic injection of morphia.

CHAPTER XXVI

HORSES (*continued*)—SHOEING, THE FOOT, ITS INJURIES AND DISEASES

The Foot—Structure—Examination—Maladies—Diagnosis of Foot Lameness—Corn—Quittor—Thrush—Canker—Sand-Crack—Laminitis.

IT is unnecessary to insist on the importance of a well-shaped and sound foot in the horse. The old saying "no foot no horse" expresses quite truly what everyone who has had experience among horses knows to be the fact.

The foot is made up of insensitive and sensitive structures; the insensitive consisting of the hoof or horny box, and the sensitive of the structures contained within it.

The hoof is divided into the *wall* (the part seen when the foot is on the ground), the *sole*, and the *frog*. That portion of the wall which is bent in at the heel and goes along the side of the frog is called the *bar* and is important, as on it should rest the heel of the shoe. The bar is best seen in an unshod foot, as unfortunately it is often cut away by the shoeing smith.

The sole is crescent-shaped, its ends being received between the wall and the bar. The frog is composed of a rubber-like sort of horn, is wedge-shaped, and fits in between the bars. The perioplic band is a structure found at the upper edge of the wall, and may be seen, when the hair is raised, as a greyish hairless membrane following the contour of the wall to the posterior parts of the frog (glomes of the frog), where it spreads out to cover these structures and becomes lost in them. The perioplic band secretes a varnish-like matter which covers the exterior of the wall and prevents its maceration by water, urine, etc. The rasping and even sand-papering of the wall at every shoeing removes the periople—a practice likely to be followed by ill consequences.

The sensitive structures of the foot consist of the *coronet bone* (or rather the lower end of it), the *coffin* or *pedal bone* (which repeats to a great extent the shape of the hoof), and the *navicular bone*, a very small bone shaped like a little boat. These three bones join together to form the coffin-joint, which is situated above the middle of the frog. On the coffin or pedal bone are found two large pieces of gristle or cartilage; the lateral cartilages—which in part project above the wall, and may be felt as yielding bodies when healthy; they are, however, as a result of inflammation, very apt to become ossified and then constitute side-bones, a common cause of unsoundness in cart horses.

The plantar cushion or sensitive frog is placed above the horny frog, wedged in between the lateral cartilages, to which it is intimately attached. It repeats the shape of the horny frog. The lateral cartilages and the sensitive frog or plantar cushion act as buffers, protecting the coffin-joint and mitigating the effects of concussion, and permitting expansion of the back part of the hoof.

Two tendons, with ligaments, nerves, and blood-vessels are also found as sensitive structures within the hoof, and covering all is the very important secretory membrane or *quick*, from which the hoof or horny box is developed, and to which it is very intimately attached. The quick may be regarded as a slightly altered skin (it is in fact continuous with the skin of the leg at the top of the hoof) which now, instead of forming hairs, forms the protecting horn. It differs somewhat in structure in certain parts of the foot. At the upper part it forms a thick band called the coronet and from it the wall is developed. On the front of the coffin bone the quick is arranged in layers (laminæ) which secrete the deep parts of the wall and firmly bind the hoof to the bone, while on the ground surface the quick spreads out as a thin membrane covering the plantar cushion or sensitive frog and the lower surface of the coffin bone; this portion of the quick secretes the horny sole and horny frog.

In most maladies of the foot the part affected primarily is the quick, or horn-secreting membrane. In pricks, a nail wounds the quick; in a corn there is a bruise of the quick; in laminitis there is inflammation of the quick (the laminæ); while *canker* and *thrush* consist in chronic inflammation of the quick.

The Examination of the Foot.—Having ascertained the absence of side-bones by pressing the lateral cartilages carefully, observe the shape of the wall, which should slope regularly from the upper surface (coronet) to the ground; there should be no hollows and no irregular rings on its surface; the angle made with the ground should be about 45°, and the heels should not be too high or too straight, constituting mule or donkey feet. Look for cracks or fissures of the wall (sand-crack, false quarter, shelly feet). Lift the foot and examine the frog, note its development, whether it is affected with thrush—a fetid discharge from the middle; or with canker, stripping off the horny frog and accompanied by an extremely evil-smelling discharge. The sole should be neither too convex (termed dropped sole) nor too concave, a shape that often accompanies contracted feet and high heels.

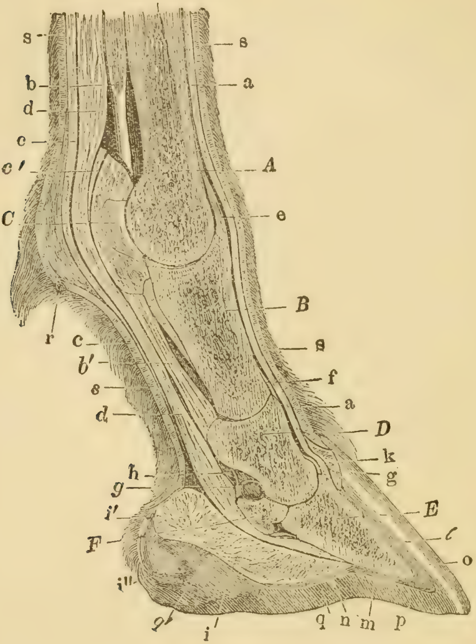

FIG. 72.

Vertical section through middle of a fore foot. (In the figure the direction of both long and short pasterns, *B* and *D*, is too nearly vertical—too steep.) *A*, metacarpal bone (cannon); *B*, os suffraginis (long pastern); *C*, inner sesamoid bone (to render it visible a portion of the intersesamoid ligament was removed); *D*, os coronæ (short pastern); *E*, os pedis (foot-bone); *F*, navicular bone; *a*, extensor tendon; *b*, suspensory ligament of the fetlock; *b′*, superficial inferior sesamoid ligament; *c*, perforatus tendon or flexor of the os coronæ; *c′*, ring passing forward from this tendon and encircling the perforans tendon; *d*, perforans tendon; *e*, capsular ligament of fetlock-joint; *f*, capsular ligament of coronary joint; *g*, *g′*, capsular ligament of pedal-joint; *h*, synovial sheath of the perforans tendon; *i*, plantar cushion or fleshy frog; *i′*, bulbs or glomes of plantar cushion; *i″*, indicates the lowest point reached by the plantar cushion, which in the figure is hidden below by the frog-stay of the horny frog; *k*, coronary band; *l* sensitive laminæ tissue (red); *m*, quick of the sole; *n*, quick of fleshy frog; *o*, wall; *p*, sole; *q*, frog; *q′*, the inner half of the frog-stay which reposes in the median lacuna of the fleshy frog; *r*, spur of horn in middle of the toe; *s*, hair-skin. [This and Fig. 73, by permission from *Horse-shoeing*, published by J. B. Lippincott Coy., Philadelphia and London.]

It is often advisable to have the fore shoes removed when examining the feet so as to ensure that corns, seedy toe, and some other conditions are absent.

Maladies of the Foot.—Pricks in shoeing are caused by a nail being driven close to or even into the quick, and may happen even in the case of competent and careful smiths when the animal has a thin crust. As a result of the injury the quick becomes inflamed and pus forms, and, seeking to escape, burrows back towards the heels and up towards the coronet, setting up inflammation of other parts of the quick and loosening the horn. Several days may elapse before lameness declares itself.

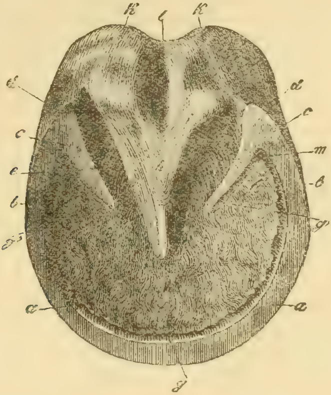

FIG. 73.

Plantar surface of right fore hoof; *a, a,* bearing-surface of the toe; *a, b,* bearing-surface of the side walls or mammæ; *b,* bearing-surface of the quarters; *c,* bar; *d,* buttress, or angle formed by wall and bar; *f,* sole; *f′,* branches of the sole; *g,* white line; it passes between the sole and bars and ends at *g′*; *h,* horny frog; *i,* branches of the frog; *k,* heels, bulbs, or glomes of the hoof; *l,* median, lacuna of horny frog. Between the bars and the horny frog lie the lateral lacunæ of the frog.

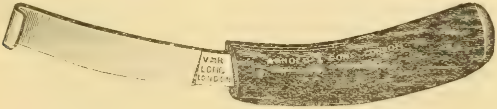

FIG. 74.—DRAWING KNIFE (LONG'S).

The diagnosis of foot lameness is not as a rule very difficult. The patient may advance the limb quite normally when walked out, but as soon as weight is put on the limb, pain is shown by the horse limping. Often there is knuckling at the fetlock—the joint is shot. When the foot of the limb affected is tapped with a hammer the horse immediately evinces pain, snatches the foot away, and holds the limb off the ground. The shoe should be removed and the wall at its junction with the sole pared down. Soon pus escapes; this is usually black, but in severe injuries it is yellow. After the pus is evacuated, further paring of the sole shows that the horn is "under-run," and separated. The cavity must be syringed with a disinfectant, 5 per cent. carbolic acid in water, and the foot put in a poultice for a few days. A "gathered nail" usually inflicts a more severe wound than a prick in shoeing. Generally it enters between the frog and sole and the consequences are related to the part wounded, being much more severe when at the middle of the frog than at the back or front of that structure, because above the middle of the frog lies the pedal joint and navicular bone. Treatment is the same as for pricks.

A corn is a bruise of the quick above the sole in the angle formed by the wall and the bar. It bears no relation whatever to a corn on the human foot, which consists of an overgrowth of the cuticle due to pressure. Corn arises for the most part from the pernicious practice of cutting away the bars and heels. The bars act as buttresses and their removal is followed by a falling in of the wall at the heel and consequent bruising of the underlying quick. Shoes left on too long and short shoes (as in hunters) are also provocative of corn. Flat feet with weak, low heels are often affected with corns. As a rule only the fore feet are subject to corns, though occasionally they are found in a hind foot.

In the treatment of corn, the shoe should be removed and the sole carefully pared at the angle of bar and wall. The horn is found to be stained with blood, and in severe cases pus is detected, and then a narrow cavity may be traced by a probe going up towards the coronet. After poulticing for a day or two the lameness will probably have disappeared, then the back part of the wall should be lowered by the rasp and a three-quarter shoe applied. At subsequent shoeings the smith must be told to use only the rasp to the heels, and not to dig out or "open up" the heels. Later on the full shoe may again be put on.

Quittor.—This inveterate foot malady shows itself by a swelling of the coronet and the presence of one or more orifices discharging a yellow pus. It may result from suppurating corns, from neglected or badly treated pricks, and also from the coronet being trodden on, or otherwise injured. In the majority of quittors the lateral cartilage is affected, and a portion of it undergoes necrosis (dies in fact), and to effect a cure it may be necessary to remove the cartilage.

The treatment of quittor should be confided to a veterinary surgeon, and consists in the injection of caustics or the insertion of caustic plugs, or, these failing, the removal of the lateral cartilage of the affected side. Poultices so frequently used by amateurs are useless or harmful in a case of quittor.

Thrush is the term applied to the condition in which a fetid discharge comes from the cleft of the frog consequent on inflammation of the quick. While it is most frequently observed in the hind feet, the fore feet or even all four may be affected. A common cause of thrush is the maceration of the horn by urine and dung in dirty and badly paved stables. The senseless cutting away of the frog at every shoeing is certainly a contributory cause and should not be permitted. Calkins and high heeled shoes preventing the frog functioning by coming to the ground at every step, give rise to atrophy of this organ, and this also tends to induce the malady. Some carters and horse owners imagine that if the frog comes into contact with the ground the horse will be lamed, a very silly idea.

In treating thrush, the first care is to see that the horse has a dry standing in the stable: there should be no holes for urine to collect in; the frog must not be cut away; a mixture of tar and salt should be introduced into the cleft—best done by soaking cotton-wool or gauze with the mixture and pushing this well into the cleft and renewing it twice a week.

Canker.—This is one of the most intractable diseases affecting the horse, and consists in a chronic inflammation of the quick, which instead of secreting healthy firm horn now produces a soapy material and an extremely fetid discharge. The connection of the horn with the quick is broken down, the frog and sole may be completely removed and, in very bad cases, the disease runs up the wall, a discharge appears at the coronet, the wall is loosened, and may come off if the animal is allowed to live. Canker commences in the frog and spreads to the sole and bars and finally to the wall.

In the early stages, when the frog alone is diseased, a cure may easily be effected by the application of sulphate of copper, of zinc, or of iron, or of all three, applied on tow and kept in position by pieces of hoop iron pushed in above the shoe. However, when the frog is extensively diseased and especially when other structures are involved, recourse must be had to professional assistance. As in thrush, it is essential that the foot should be kept dry.

Sand-crack is a fissure in the wall commencing at the coronet and proceeding a variable distance towards the ground surface. In the hind foot it is found at the toe, and in the fore foot at the quarter, as a general rule. Though it may arise from an injury to the coronet (which secretes the wall), sand-crack is mostly found in horses that produce brittle "shelly" horn, and is therefore often a constitutional defect. Sand-crack frequently exists without lameness, this being produced only when the fissure goes so deep as to involve the sensitive laminæ (the portion of the quick covering the pedal bone).

When lameness accompanies sand-crack the shoe should be removed and the foot poulticed with bran for a couple of days; then the edges of the fissure must be carefully pared, and the wall near the crack rasped. If the crack is at the toe, where the wall is thick, a firing iron at a dull red heat is used to draw two lines to form a V from coronet to ground surface enclosing the crack, the area of wall within the V being afterwards well rasped down. The wall is sometimes bound with tarred cord, or a stout leather strap is applied very firmly. When the sand-crack is at the quarter, transverse lines are drawn across it with the firing iron; care is required because the horn is much thinner than at the toe. Tarred cord or the strap may also be used. If the horse can be rested, a blister to the coronet and a run at grass will complete the cure. Instead of a toe-clip, two side-clips should be drawn on the shoe.

Laminitis, as stated at p. 558, may be due to several causes, but, curiously enough, is mostly the result of disturbances of the digestive processes; it may, for instance, follow the administration of an aloes ball. Wheat or flour, even in moderate quantity, may set up the malady, while **overloading** the stomach with other cereals is a common cause. A specially severe form —**parturient laminitis**—is seen after foaling, from retention of a portion of the afterbirth. Whatever the cause, the process consists in swelling of the inflamed sensitive laminæ and the pouring out of a fluid from their distended blood-vessels. As the parts affected are enclosed in a rigid horny box, the patient must suffer great pain. It is particularly in the region of the toe that the disease is active, and this accounts for the peculiar mode of progression adopted by the animal, which goes on its heels.

Symptoms.—In a well-marked case the following symptoms are observed: The patient stands rooted to the ground and is moved with difficulty, the respirations are accelerated, and the temperature is raised to 103-104. On taking the pulse at the angle of the jaw, the artery is found to be tense and full (corded) and the beats rapid, 60-80. The bowels are usually constipated and the appetite is in abeyance. The belly is retracted. On forcing the animal to move, it shows lameness in the fore feet. When an attempt is made to back it, the trunk is carried back but the feet are not moved, the patient swaying on its heels. When made to go forward, it walks on its heels.

Treatment.—The shoes of the fore feet must be removed and the feet put into bran poultices, which are to be moistened frequently with hot water. A pint of linseed oil should be given, to be followed by half a pint in twelve hours if the bowels are not freely moved. As the patient in this malady stands persistently, it should be cast, and if it rises should be again cast in four hours. A good method of casting a horse in a stall is the following: The head being tied rather short to the manger, fasten a rope to the near fore pastern and pass the end under the chest and over the back to the near side again, and confide it to a man standing in the next stall on the left. Fasten another rope to the pastern of the near hind leg and pass it under the belly and give it to a man in the next stall on the right. On the ropes being strongly pulled the horse will slide down on the near side and will probably not attempt to rise for some hours. After three or four days a marked improvement ought to be noticed, especially if the bowels are acting freely; and now a pair of thin heeled shoes or a pair of round shoes should be put on, and exercise given on soft ground. When recovery is not complete the disease becomes chronic; the sole drops and instead of being concave assumes a convex shape, the horse going, for a time or permanently, on its heels, while the toe elongates and the wall shows numerous irregular rings. In parturient laminitis, in addition to the above treatment, it is necessary to wash out the womb with a warm antiseptic solution. Horses suffering from chronic laminitis with dropped sole are best shod with round shoes, thin at the heels and well seated out.

CHAPTER XXVII

SHEEP—ISLAND, MOUNTAIN, AND MOORLAND BREEDS

Remnants of Ancient Breeds of **Island Sheep**—The St Kilda or Hebridean—The Soay—The Shetland—The Faröe Islands' Sheep—Piebald or Spotted Sheep—**Mountain** and **Moorland Breeds**—The Cheviot—Scotch Blackface Highland—The Shepherds' Calendar—Habits of Mountain Sheep—Shepherding—Shelter.

SHEEP belong to the genus *Ovis*. They have been subjected to domestication as far back as records go. They are classified in various ways in this country: horned and hornless, blackfaced and whitefaced, mountain and lowland, long-wools and short-wools, long-tailed and short-tailed. Iceland sheep possess remarkably small and insignificant tails. In the East there are sheep with rudimentary tails and large masses of fat on the rump; while others, again, have the fatty development in the tail itself. Two is the usual number of horns, but in the Western Islands of Scotland remnants of the ancient polycerate sheep exhibit four horns, or at times even a greater number. A general characteristic of the sheep is the presence of only one pair of teats from which milk can be drawn, though a second rudimental pair is not infrequently seen in British breeds. Since 1890, four-nippled ewes and rams have been collected and successfully bred at Beinn Bhreagh, Cape Breton Island, Nova Scotia, by Dr A. Graham Bell, and latterly six-nippled sheep have been developed.[1]

Fecundity, or the state of being prolific, differs much in different breeds of sheep, and in different specimens of the same breed. Some bear single lambs, some twins, and some triplets, while four and even five have been known to be brought forth at one birth. Although the local surroundings, including the kind, quality, and quantity of food, have much to do in determining the issue, yet there is unquestionably an inherent propensity in certain ewes to follow regular habits in the matter of producing certain numbers of offspring. If sheep are well fed (but not too fat), and only the young of those bearing twins bred from, the flock after a time becomes distinctly more prolific. Dr Graham Bell got ample evidence of this fact in his multi-nipple flock.

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[1] *Science*, vol. xix., p. 767, and vol. xxxvi., No. 925.

POINTS APPLICABLE TO MOST BRITISH BREEDS OF SHEEP.

(*Exceptions in various breeds will be named when they occur.*)

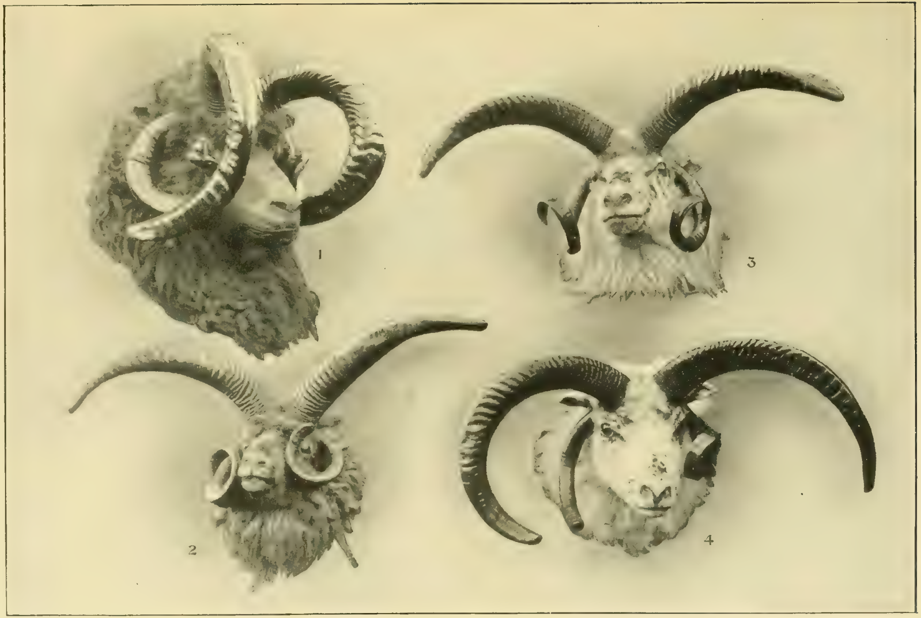
1. A graceful *carriage* and springy style of walking. 2. A characteristic *head* with good depth and strength of *jaw*, and breadth across the bridge of the *nose*, and full bright *eyes*, indicating docility and courage. 3. The *neck* thick towards the trunk, tapering to the head, arching slightly, and not too short. 4. The *chest* broad, deep, projecting well in front of the fore legs, and descending from the neck in a perpendicular line. 5. The *back* level, broad behind and before (except in the Cheviots and the Lonks, which have sharp shoulder-tops or withers), with a uniform covering of *flesh*, not boggy to the touch, but firm and muscular; *under-* and *upper-lines* straight. 6. The *ribs* well sprung, rounded and deep. 7. The *shoulders* well laid and covered with firm flesh. The regions immediately behind the shoulders filled up. 8. The *thighs* and *gigots* and also the *arms* and the *fore flanks* fleshed well down. 9. The *rump* (or part near the dock) well developed, though not too fat and large, as is sometimes the case in Cotswolds, Border Leicesters, and other heavy-fleshed breeds. 10. The *quarters* long and not drooping behind, and the spaces between them and the last ribs short and well filled. 11. The *legs* straight and set wide apart, not too long; the *bone* clean and fine, and neither coarse nor deficient: the *hocks* are much better slightly turned outwards, than at all inwards or "cow-hocked." 12. The characteristic *wool* of the special breed covering well the *body*, and particularly the belly; also the scrotum of the ram. (See Appendix A, "Live Stock Societies—Sheep.")

REMNANTS OF ANCIENT BREEDS.

Four-horned Sheep.—The diminutive **four-horned Western Islands sheep**—of which a remnant still exists in ornamental flocks in the parks and domains of the aristocracy, and, in a more or less mixed condition, in some of the Western Islands—divides with the extinct Tanface breed the distinction of having probably been aboriginal to Scotland. From the accompanying Plates (CXLIX. and CL. A), and from the subjoined specific information relating to two branches of their progeny, a good idea may be formed of the character of the breed. It was small, hardy, and like (probably) all the primitive sheep of the British Isles, covered with a small fleece of very fine wool. James Greenshields, Westown, Lanarkshire, had towards the end of last century a small flock in the Isle of Man. The wool was of many colours—white, brown (locally termed "loaghton"), black, and black-and-white—of very fine quality, but only about 1½ lb. per sheep. The animals weighed only 5 lb. or 6 lb. per quarter, and the ewes proved to be such indifferent nurses that they were eventually put away, after producing, by Border Leicester rams, lambs that ranked only as shots. One of the brown Four-horned Manx rams was put among Scotch Blackface Mountain ewes on Westown, after the Leicester tups were brought in, to pick up ewes that had not settled, and among the resulting lambs was a brown tup lamb with four horns like his sire. The half-bred Manxman was again put with the pure Blackface ewes under similar circumstances. His produce were all white, even the faces, although the mothers were mostly black in the face, but about one-half had four horns. The practice of putting out a four-horned ram each year with less and less Manx blood, was continued until the last that is recorded (which had five horns, though one was broken off at an early stage) was practically and to appearance, except for the horns, pure Blackface, having had five Blackface ewe crosses. The persistency of the old breed was so remarkable that half of the lambs still had four horns. All the successive ram heads, mounted, form an interesting and unique collection (Plate CXLIX.). The second crosses from the original Four-horned tup proved to be as good milkers as the pure Blackfaces, and some were fine large ewes, especially those that took after the mothers in having but two horns. The ram to which the most recent head belonged weighed 20 lb. per quarter, and his sire (which had the finest head of all) was a larger sheep.

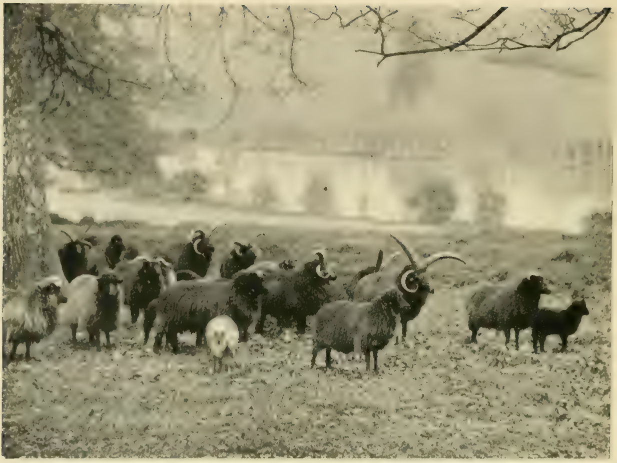
The following paragraph (edited) from *The New Statistical Account of Scotland*, 1841 (vol. xiv), by Rev. Archibald Clerk, Minister, Duirinish (Island of Skye), is illuminating:—

"The breed of four-horned sheep indigenous to the Highlands, termed the little sheep, *Caoirich Big*, was kept by the poor people, but they were very worthless compared with the larger kinds introduced from the south. They were very diminutive in size, seldom weighing more than 30 lb., and of a great variety of colours, white, black, grey, brown, and sometimes a mixture of all these colours. They were, however, useful to the common people, as they required very little food, and were so tame as to allow themselves to be milked daily. Their wool was of fine quality; and their mutton possessed a delicacy of flavour which far surpassed that belonging to the best fed of the larger kinds. 'These sheep at one time constituted all the flocks of the country, and it is not above forty years since the *Caoirich Dhubhceannach*, or black-faced (literally, black-headed) breed of the south, were introduced here. The black-faced sheep were found to answer very well, but they were then rapidly giving place to the Cheviots, *Caoirich mach* (literally, polled sheep), which are found to answer still better. Every extensive farmer in the parish has adopted them as the most profitable stock; and great attention has been paid to their improvement, so much so, that it is generally admitted that there are no better sheep in the whole



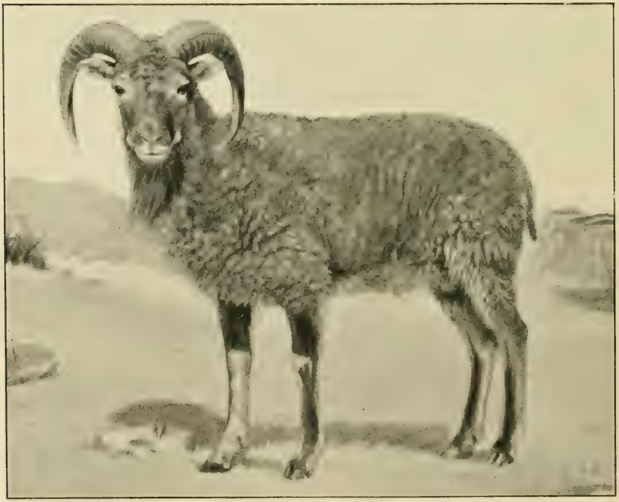
MANX FOUR-HORNED AND SCOTCH BLACKFACE CROSS RAM HEADS.
Got by one pure and three cross rams on Blackface ewes.
1. First cross, brown, like a pure four-horned ram. 2. Second cross, white, with grey-dun face.
3. Third cross, white, with speckled face. 4. Fourth cross, a Blackface sheep but for the horns.
Bred and owned by the late James Greenshiels, Westtown, Lanarkshire.

[*Brown & Co. Lanark.*



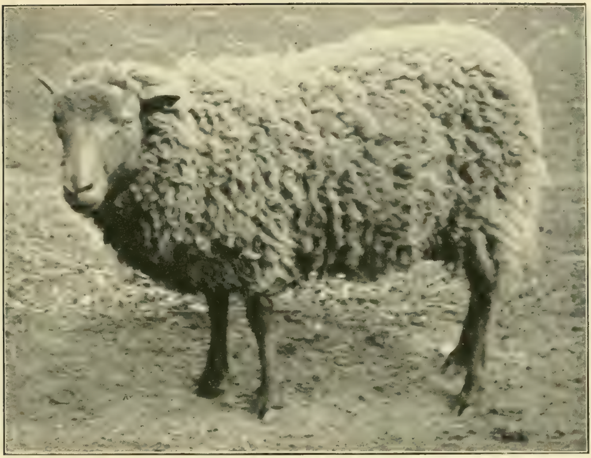
A. Four-Horned Sheep, originally from the Western Islands of Scotland. Now more or less mixed with other blood. Kept in parks and policy grounds of country-seats throughout England and Scotland.

[*C. Reid, Wishaw.*

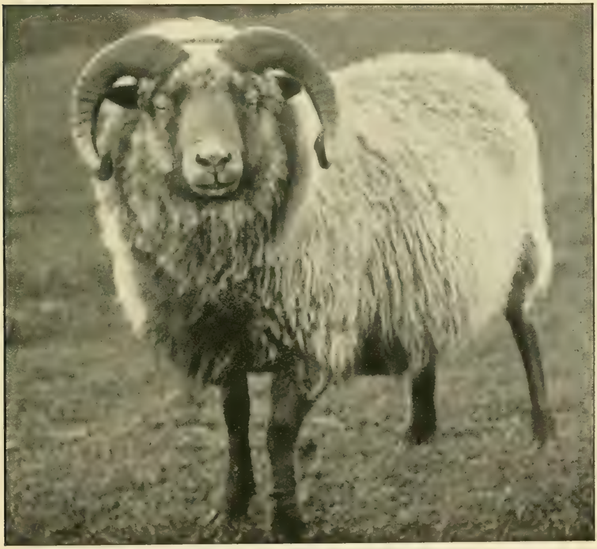


B. Soay Ram.

[*Block lent by the Highland Society.*

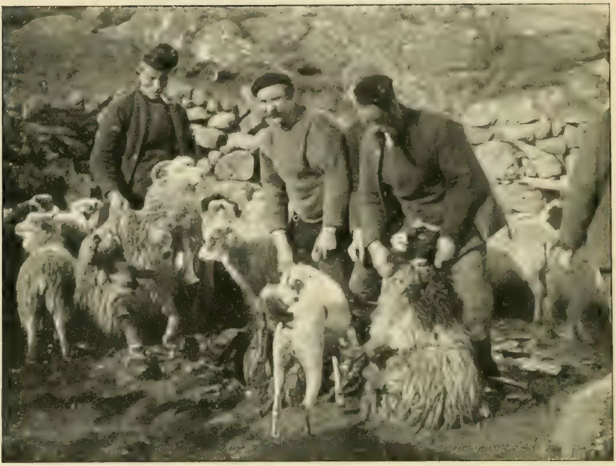


A. Shetland Shearling Ram (Polled).
Bred by H. J. Elwes, Colesborne, Gloucestershire.



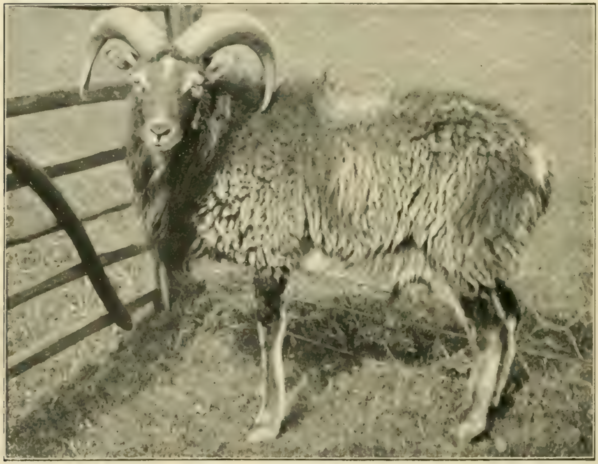
B. Shetland Ram. A remnant of a breed being improved out of existence by crossing.

PLATE CLII.



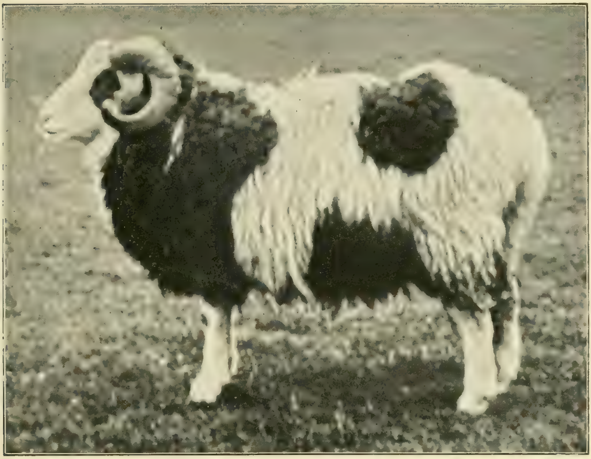
A. Faroe Islands Sheep, of Scandinavian Origin.
In a "raett," or fold, in which the wool is removed by pulling.

[*Miss Elizabeth Taylor.*



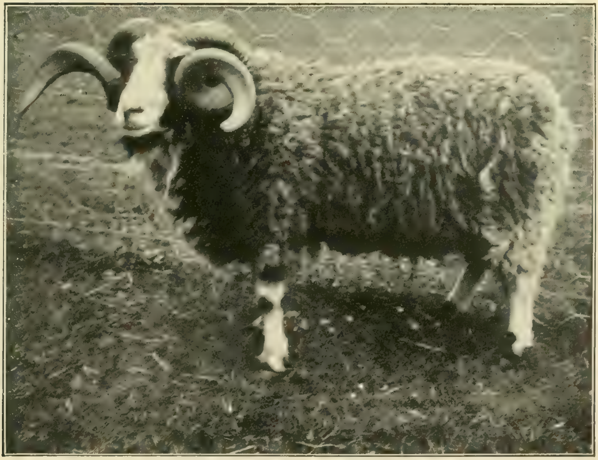
B. Hybrid Ram—Urial ♂ and Soay ♀.
Bred by Sir Claud Alexander.

[*From "Elwes' Guide to Primitive Breeds of Sheep."*



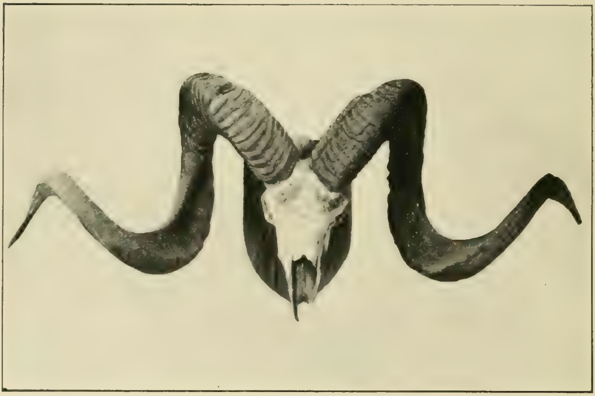
A. Piebald Ram. Yearling bred by Sir Claud Alexander.

[*From "Elwes' Guide to Primitive Breeds of Sheep."*



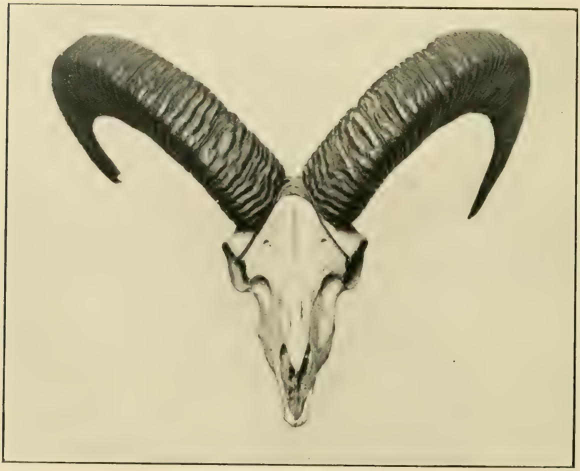
B. Old Piebald Ram.

[*From "Elwes' Guide to Primitive Breeds of Sheep."*



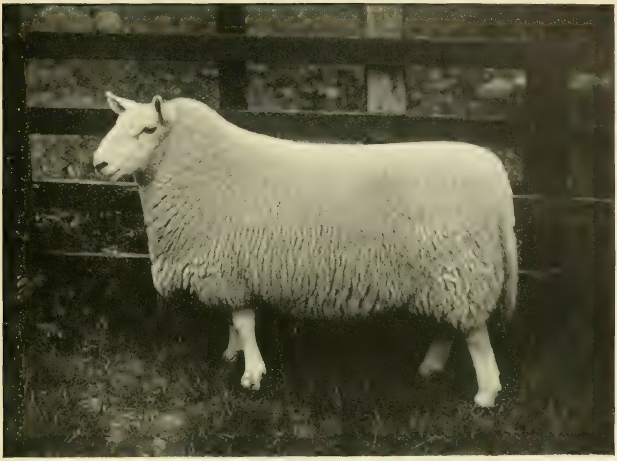
A. SKULL AND HORNS OF MARCO POLO'S WILD (ASIATIC) SHEEP.

[*From "* ***Elwes'*** *Guide to Primitive Breeds of Sheep.*

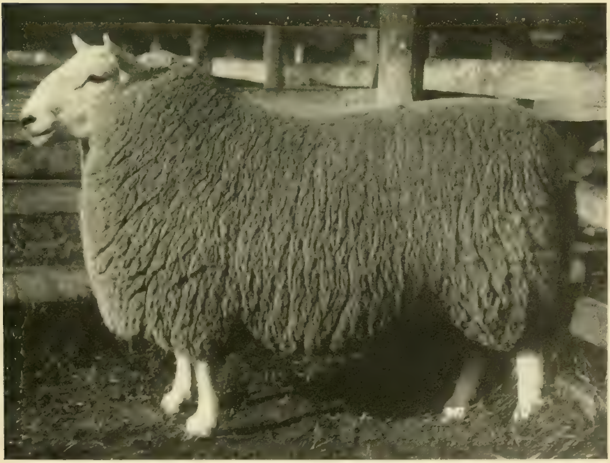


B. HORNS OF WILD URIAL from N.-W. India.

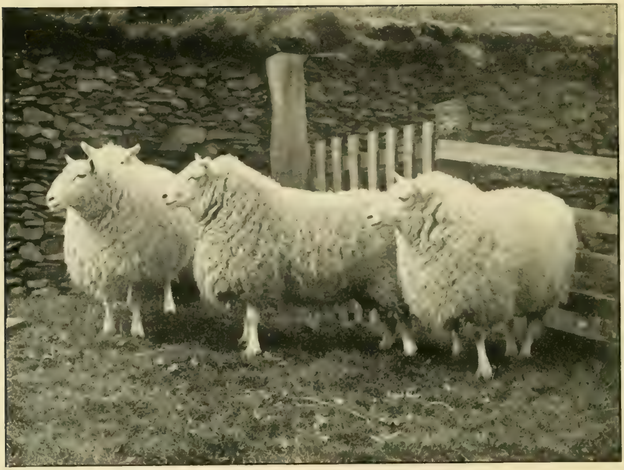
[*From "Elwes' Guide to Primitive Breeds of Sheep."*



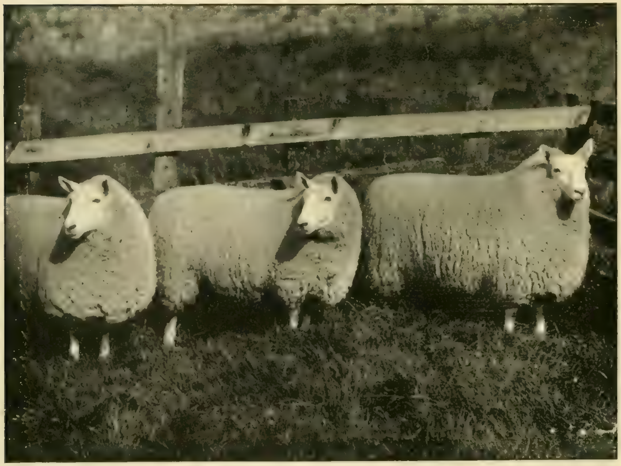
A. Cheviot Ewe of the West Country Type.
Many prizes, Highland Society, etc., including a Champion Cup at Moffat, 1886.
Bred by J. A. Johnstone, Archbank, Moffat.



B. Cheviot Ram, "Gay Lad."
Bred by Dobson & Murray, Parkhall, Douglas, Lanarkshire.



A. Cheviot Two-Year-Old Rams, Sons of "Sandy Walker."
First and Second at Hawick about 1899. Bred by the late Miss Grieve, Skelfhill, Hawick.



B. Cheviot Ewes.
Bred by J. R. C. Smith, Mowhaugh, Kelso, Roxburghshire.

[*W. H. Stimpson, Kelso.*

country than are reared in this parish.' Black cattle have almost entirely given place to sheep—two men only keeping fine folds of cows—and crofters kept inferior descriptions. In Laggan parish black faces 'were supposed to be more hardy, and to stand the winter better than Cheviot stock.'"

In St Kilda, on the authority of the Rev. J. B. Mackenzie, of Kenmore, Aberfeldy, from the notes (taken probably about the middle of last century) by his late father, who ministered in the islands, the two small islands Soay and Dun, in the hands of the proprietor, Macleod of Macleod, possessed some 400 and 80 respectively of the old Four-horned breed. Probably the only cross took place many years ago with the old established Tanfaced sheep of the Scottish mainland mountains. The prevailing colour is a light brown, called "lachan"; but white, black, and yellowish-brown also occur, and, till recently, it was very common to see some sheep with five horns. The ewes are prolific, having generally twin lambs. Their mutton is very sweet when fresh; but as it is seldom fat it does not salt well. The old Scotch practice of salting mutton has almost died out on the mainland, owing to the enormous and ever-increasing supply of fresh meat pouring into the country, and to the increase in the consumption of pork.

On the other islands—where ten sheep go with each allotment, and one shilling of rent is paid for each additional one kept—the sheep are larger, fatter, and longer in the wool, the result of crossing with Blackface Highland rams, which were first imported about 1840. As another consequence of crossing, more of the sheep are white. Wethers from these sheep in St Kilda proper have made 10 lb. up to 14 lb. of tallow. The total number of sheep in the islands is about 2000. The short fine wool has more coarse hair (kemp) mingled with it than that of any of the modern improved breeds.

The St Kilda or Hebridean sheep of to-day is evidently descended from a cross with the Blackface, of which it is recorded that the rams also introduced scab, and many sheep died before it could be eradicated.

The original breed, believed to have come from Norway, was described by Dr J. Walker[1]:—"The Hebridean sheep is the smallest animal of the kind. It is of a thin, lank shape and has short straight horns. [This reference is probably only to the horns of ewes.] The face and legs are white, the tail extremely short, and the wool of various colours; for besides black and white, it is sometimes of a bluish-grey colour, at other times brown, and sometimes russet, and frequently an individual is blotched with two or three of these different colours. In some of the low islands, where the pasture answers, the wool of this small sheep is of the finest kind, and the same with that of Shetland. In the mountain islands the animal is found of the smallest size, with coarse wool, and with this very remarkable character that it has often four, and sometimes even six horns." All authorities agree that the polycerate condition in primitive sheep, in crossing with two-horned or polled breeds is dominant.

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[1] *Economic History of the Hebrides*, ii., 69 (1812).

Since the foregoing account was written, a considerable advance has been made in the common knowledge of primitive breeds of sheep still represented in this country. The late Henry J. Elwes, of Colesborne Park, Gloucestershire, was for a good many years conducting interesting experiments under his personal observation in the crossing of English park sheep, including the primitive breeds mentioned.[1]

Of the Soay sheep he says:—"It is the smallest of the aboriginal sheep, the British representative of the short-tailed breeds of Northern Europe, Iceland, and the Faröe Islands, nearly allied to the wild Mufflon found only on the islands of Corsica and Sardinia," which, however, grows hair, not—like its northern relatives, with which it crosses freely—wool,[2] of exceptionally fine quality. It is believed to have been the original breed of St Kilda, though now confined to the rocky uninhabited Island of Soay in a state of primitive wildness, and only seen annually by visiting sea-bird egg collectors. Elwes refers to a previous paper on "Soay sheep" in the *Scottish Naturalist*, 18th February 1912, which states that there had been no four-horned sheep on the Island of St Kilda in recent times, but in *Macaulay's History of St Kilda*, 1764, it is recorded that "there were about 1000 sheep on the main island, 400 on Boreray, and 500 on Soay, every one with two horns and many with four." Their wonderful fruitfulness was illustrated by the fact that one ewe had three lambs in March, and three more within a year, and that each of the first three had a lamb before it was thirteen months old—nine progeny in thirteen months. Millais, in *Mammals of Great Britain*, says the breed is quite distinct from the Hebridean four-horned breed usually called St Kilda sheep. There is a local tradition that rams from St Kilda were put on the Island of Soay, which probably introduced the white faces that occasionally appear, "but the true colour is a pale brown murret, or fawn, with paler belly and mouth, and the lambs when first dropped are of a rich reddish colour." The breed is very long lived as well as prolific, but degenerated by long in-breeding, and in parks requires good feeding and plenty of room. Elwes favours a cross with the Southdown, owing to the high opinion of H. Sanderson of Galashiels of the **quality of the wool**, which for "its fineness and handle is, there can be no question, a big advance on all the wools at present grown in this country." But it is a vain hope to expect to breed a commercial sheep on hill country, where alone it would pay, because of its inability to withstand the severity of the climate. The Soay sheep, in Elwes's words, so far as this country is concerned, "would seem to have little, if any, value from an agricultural point of view."

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[1] *Guide to the Primitive Breeds of Sheep and their Crosses, etc.*, by Henry John Elwes, F.R.S. (illustrated), Edinburgh. Printed by R. & R. Clark, Ltd., June 1913.

[2] See Plates CCXIV. and CCXV.

In the West Indies, however, it has developed a new but useful function. On some of the exceptionally rich grazing land of Jamaica, the ewes of our common breeds become so fat that they cannot breed, but the Soay sheep and its first crosses breed freely and do well. They form the only practical check to the luxuriant growth of the sensitive plant, that cattle do not eat, and which, when not eaten down by sheep, takes possession of the ground to the exclusion of the good pasture plants.

The original **Shetland Islands sheep** was, according to **Youatt**,[1] of Danish origin, and was celebrated for the unrivalled fineness of its fleece, and for its diminutive size, its extraordinary hardiness, and the superior quality of its mutton. He says, in the case of the pure-bred ram :—

> "His skin when the hair is parted, his palate, the bridge of his nose, his horns and his hoofs should be white. The hornless breed is the best. The body should be long, the legs short, the hoofs broad, the head narrow; the wool fine on almost every part, and weighing from 1½ lb. to 2 lb., worth on an average from 3s. to 4s. per lb. By the cross with the Dutch, which used to be the prevailing one, the carcase is heavier, the wool coarser, the fleece weighing 4 lb. or more, but not worth one-fourth so much per pound. The tail is about 6 in. long, and shaped like a flounder, whence arose their name, the 'flounder-tailed' sheep. [Although many different alien crosses have been made, the wild habits of the sheep and the soft nature of the foreign blood have probably prevented much outside blood from establishing itself in the so-called improved variety.] In both breeds the wool is mixed with hairs resembling those of the ruminants of almost every cold climate. The process of shedding the coat is not uncommon in other animals in cold countries. The wool begins to loosen at the roots towards the close of the winter, and gradually rises through and separates from the hair, and would be eventually detached and lost; but, towards the end of March or the beginning of April, the Shetlander collects all his sheep in 'punds' and 'crûes' in order to pull the wool, which is done with little inconvenience and no pain to the sheep. The common operation of shearing is out of the question. The wool contains many hairs which require to be dressed out. The animal is still covered by a thick coat of hair, which forms a sufficient defence against the cold of the early spring months. When the wool has attained the length of 3 in. the hair in turn drops off; but this is a slower process, regulated by the growth of the new hair. On the approach of winter a perfect double coat of wool and of hair is again formed."

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[1] Doubt has been thrown by some commentators on Youatt's description, as he was a veterinary surgeon and not a practical breeder, but no other early description is available.

This relationship of wool and hair in the most perfect coat for resisting the inclemency of the weather is a key to the appearance of "kemp" or dead hairs in the coats, more particularly of mountain sheep.

The late **Z. M. Hamilton**, of Shetland, wrote, in October 1905:—

"Youatt's description does not quite hold good for the Shetland sheep of the present day, as the only two islands on which they are really pure are Foula and Papa Stour. Certainly they are celebrated for fineness of wool, diminutive size, and excellence of mutton, as also for hardiness where they have access to the seashore and can get a supply of seaweed; but if confined on hill ground I do not think they are hardier than the Blackface sheep. The average weight of a Shetland sheep's fleece is about 2¼ lb.; price at the present time varies from 2s. 6d. for best *murret* [moor red] wool to 10d. for the coarser qualities of black and white. The weight of a ewe off the hill is about 32 lb., and that of a three- or four-year-old wether 38 lb., but if fed on good green ground the latter will reach 42 lb. The tail is slightly like a flounder, thick or flat at the root, and coming to a sharp point, and rarely exceeds 4 in. long. On some, but by no means on all sheep, there are coarse hairs. Many of these hairs come off along with the wool in the end of May or June. A number, however, often remain fixed to the skin. If it is wished to retain the fine nature of the wool, it must be 'roved' or pulled off. It rises from the skin if the fleece is ripe. If a Shetland sheep is once clipped it seldom can be 'roved' again, but must be again clipped. The clipping makes the wool much coarser, and in the clipped fleece there is of course a quantity of new wool, useless for 'hosiery' purposes, with the old. When the wool is being hand-carded and spun, all the new wool is forced off and thrown away; consequently a clipped fleece is of much less value to the crofter's wife or daughter, who manufactures the fleece into hosiery. It is no uncommon thing for a Shetland woman to get (pre-war prices) from 18s. to 25s. for the proceeds of one Shetland fleece after it is spun and knitted.

"The native sheep are driven into 'crûes' or 'punds' almost every week from about the 15th of May till the end of June, because there is such a difference in the time between sheep being ready for 'roving.' It may be a week or more from the time that the *sides* of a sheep are roved till its *back* is ready. Shetland sheep, although miles out of sight of the sea, know when the tide begins to go back and all make for the shore. The Shetland crofters believed—and some of the older people still believe—that there is a worm in a sheep's foot that moves when the tide begins to go back."

It is acknowledged that the wool of the Shetland breed is the finest and most valuable of any wool grown in Britain. Dr T. Edmonston, in *General Observations on Shetland*, 1840, remarks:—"The sheep is small, not often horned, ears pointed and erect; face black and tail short, fine-boned, legs long; naturally wild, active, and hardy, and little liable to disease; the colour generally white, sometimes ferruginous, grey, black, or piebald; the wool very soft and often fine. The more damp and mossy the pasture the softer is the wool." Serious losses are sustained from sheep falling over precipices facing the sea. "No breed can be better adapted to the Shetlands than those that are native in them." H. Evershed, writing on the agriculture of Shetland over forty years ago in the *Highland Societies' Transactions*, states that the Blackface breed was able to live and thrive wherever the native sheep could live, and, owing to the much higher price of their lambs and the greater quantity of their wool (which was relatively dearer than other wools in later years) they, together with Cheviots, half-breds, and cross-breds, had supplanted the native breed on all the improved land, leaving the native breed only in crofters' hands, on the very worst of the land and common grazing. He quotes Shireff for the fact that the native breed had been much mixed with Dutch sheep during the time when the fishing was in the hands of Dutch merchants. He calls it "a straight-horned goat-like breed." The foregoing historical statements (omitting straight horns) hold good up till within a year or two of the Great War, but there has been an increasing tendency since 1905 (when H. J. Elwes began his breeding experiments at Colesborne Park, Gloucester), to establish small flocks away from the Islands under surroundings of a very different type, and this has led to the development of characteristics not previously emphasised. The largest English operator and a rival pioneer employing systematic business methods of breeding and management, was the late Stephens of Cholderton, Salisbury, who sent his manager to the Islands to buy 400 sheep, which were weeded down to about half the number. Other breeders have been: Sir John Stirling Maxwell, Bart., at Pollok, near Glasgow and Corrour in Inverness-shire; Lady Leconfield, Petworth Park, Sussex; Walter Rawnsley, who has acclimatised them on the Island of Raasay; Balfour of Dawyck; A. Cowan, Penicuik; Professor Cossar Ewart, Penicuik; Captain John Stirling, Fairburn, Muir of Ord; the Board of Agriculture for Scotland, and a few others who own a small number. One central idea has been to cross the Shetland with other mountain and lowland breeds, chiefly the Blackface, the Cheviot, and the Border Leicester, with the object of improving the feeding qualities and of increasing the amount of wool, while, if possible, retaining its pristine fineness for the making of knitted shawls and other specially fine fabrics. The Foula sheep because of their purity were chosen, in which murret of varying shades predominates and black occurs. The following are the indications of what is possible and what impossible under the new circumstances. Crossing with other breeds is a failure from the commercial farmers' point of view. A degree of fineness surpassing that of other fine wools, and equal to the finest quality of Shetland wool cannot be attained, and although the yield can be doubled, uniformity cannot be depended upon, and the total money return for the cross-bred wool is less. It has been demonstrated that the one and only way to accomplish improvement combined with financial success, is selection. Moreover, woollen manufacturers declare that what they want is not an improved cross-bred wool, but improvement in the quality of pure-bred wool, whether it be Cheviot, Down, or Long-wool, and that they can best combine the wools in the manufacture to suit their various purposes. This gets over the difficulty of acclimatisation. As mutton-producers the crosses are unable to compete with the lowland breeds and their crosses. There is, however, an important place for the Shetland breed among the numerous varieties of British pure-bred sheep; if exceptionally fine wool, bringing very high prices, not mutton, is the object aimed at. The hair of the double coat, now no longer required, can by degrees be eliminated by breeding from rams with fleeces of fine close wool, and discarding those that incline to the hairy mixture. Having in view the dangers of inbreeding, the numbers of ewes in existence are not so great that otherwise desirable ewes can at present be cast because of the presence of hair, which, it must not be forgotten, is correlated with the finest quality of wool. So far the Shetland from home has generally been kept as a park sheep, where it is clipped like other sheep, but its hardiness and freedom from foot rot, loupin' ill, and braxy, point to its usefulness as a mountain breed to restock Highland areas where Blackface and Cheviot hoggs require to be wintered away at prohibitive expense. It would be impossible to fatten the wether lambs after weaning, like those of other breeds, but the lambs still sucking are remarkable for fatness, and the wether lambs would, in most seasons, bring good prices at weaning. It may be necessary to go back occasionally to the islands for rams to counteract a tendency for the wool to become less fine and soft. This is necessary when the breed is kept as park sheep, but it may not be required when it becomes established in mountain flocks. If the murret becomes, as sometimes happens, lighter in shade, the more valuable deeper tint may be developed by the use of a black ram. There is a tendency to become grey with age from the increase of white fibres of wool which are to be found on close examination of the fleeces of many young sheep. The belly or under-covering of the breed is unequalled for fineness and completeness by that of any other breed. The forehead is also wooled. The eye is very prominent and alert, and of a light grey colour with something of a murret shade in it. Although the head may be described as small, and the snout appears to taper in the female owing to good width of forehead, the nose of the ram shows strength and character. The horns of the ram, strong at the base and tapering to a point, have some resemblance to the horns of a goat. They may be present or absent. The ewe is usually without horns, and when present they are small and insignificant, not unlike a little human finger crooked but not drooping. The ears, set well up, are gracefully shaped and taper to a sharp point. The bones of the limbs give a fine-bred appearance. The withers are very high and sharp, and the back bone prominent. The animals are difficult, almost impossible to fence with dry stone walls, and when kept with other sheep they are liable to give trouble by leading them to stray. Their sense of smell is remarkable. They have been known to follow a shepherd's track through heather entirely by the scent like a collie. Is it not possible that it is by scent that Shetland sheep become aware of the ebb of the tide, the characteristic smell of a wet beach being wafted inland by the breeze? (See Appendix, G I "Shetland Sheep.")

The Faröe Islands[1] sheep (Plate CLII. A) are a small, short-tailed breed, supposed to have been formed probably about two hundred and fifty years ago, after a severe storm had killed out most of the original breed. This was accomplished by blending the short-tailed Iceland sheep with a Norwegian breed, and no doubt a remnant of the native breed, a small brown, fine-wooled sheep resembling the Four-horned breed of the Western Islands. It ran wild on one of the islands till a few years ago, when the last specimens were killed to make room for the common domesticated sheep. A few Blackface Scotch mountain sheep were also taken to the Southern Islands. Cheviots have from time to time been introduced into the islands, but little trace of them is seen, as, if their cross-descendants survive, they soon lose their characteristic features. A pure Cheviot, or one with a slight admixture of native blood, is not suited to the climate, as the wool becomes saturated with the constant rains and cannot dry as quickly as that of the native sheep, and the animal gets chilled.

The existing domesticated breed, especially of the northern fjelds, is very hardy and of many colours of wool and hair, for example: white all over; steel grey; jet black; dark murret or brown—like the majority of the so-called black sheep of our British flocks; light murret, a rose or reddish-dun (resembling that of the extinct Tanfaced sheep), with black fore-shoulders, neck, and face, and with a white ring round the muzzle and eyes, and a white spot on the forehead. Some white sheep have a ring of black round the muzzle and on the tips of the ears, and others grey spots on the face and legs. Like

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[1] Faröe signifies the sheep islands, and they graze over 100,000 sheep. There are seventeen inhabited islands, out of a group of twenty-two belonging to Denmark, lying between Shetland and Iceland. Indebtedness is acknowledged to Miss Elizabeth Taylor for information about the Faröes.

Herdwick sheep, the rams have heavy horns, while the ewes are hornless, and all tend to become lighter in colour as they advance in age. The wool is not shorn, but pulled about midsummer, the sheep being collected in a "raett" or fold and tied by the legs (Plate CLII. A). The fleece shows a perfect combination of the double coat so characteristic of the original Shetland breed—long straight hair being seen on the surface, and short, downy, soft wool arranged like a bed of the finest moss underneath, through which the long hair grows and projects, so that it overlaps and thatches effectively the woolly undercoat.

The Piebald or **Spotted Sheep**,[1] an ancient ornamental breed, which may be found represented in probably 150 policy parks in England, is of quite unknown origin, though it has from time to time been referred to as Spanish, Portuguese, Persian, African, Zulu, Syrian, and Barbarian. It was no doubt originally two-horned, the four horns, which are not uncommon, having crept in by occasional crossing with four-horned ornamental park sheep which are also widely distributed among the country residences of well-to-do people, and now maintained by selection, more in some instances than in others. This assumption is supported by the fact that "the piebald breed seems to be the only long-tailed race in which the four-horned character is common." In spite of the uncertainty about the numbers of horns, it is declared that "the pictures of the breed at Tabley House painted about 1760, and by Stubbs at Wentworth about the same date, prove that the breed has been little, if any, altered in appearance for over 160 years."

Piebald sheep are naturally wilder than low country sheep, but they are easily tamed and not given to jumping fences like the mountain breeds. The wool, although normally coarse, is capable of improvement by selection in breeding. They are noted for hardiness and freedom from lameness; for being prolific and excellent mothers; for the production of very superior mutton, and for ability to thrive on heavy land as well as on limestone. "Though they do not, when kept on grass alone, fatten so quickly as some improved breeds, yet the wethers average about 60 lb., dressed at fifteen to eighteen months old off grass which can only be described as second or third class." The rams cross satisfactorily with ewes of the common breeds of this country, but "it is a curious fact that, when our piebald sheep are crossed with any other domestic breed, the lambs are practically all born black with a white patch on the forehead and partly white tails." This is in keeping with the experience gained in crossing some ten breeds of Scotch and English ewes with the Karakul ram, only the white patches on the forehead and tail were of comparatively rare occurrence.[1]

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[1] Described in Henry J. Elwes's *Guide to the Primitive Breeds of Sheep and their Crosses*. See also footnote page 578.

MOUNTAIN BREEDS.

The Cheviot is named from the range of rounded or cone-shaped green hills, growing a superior quality of pasture, on the Scottish and English Border. "Cheviots are now mostly bred in Roxburgh, Dumfriesshire, Peebles, Sutherland, and Northumberland." The low price of wool and the rage for young mutton greatly reduced the number of Cheviot wethers, at one time kept till they were three or even four years old. The lambs are now sold to low-country graziers, and mostly fed-off within a year, at weights not far short of the hill-fed wethers of the past. The ewes are kept on the lower and less exposed green hills. Cheviot wethers and Blackface Highland ewes go to greater heights, or occupy positions on the black or more heathery land at lower elevations. The great fairs or marts where the surplus of draft stock is sold are held at Inverness in July; at Rothbury, Hawick, and Lockerbie, in August, for lambs; and in October for ewes and wethers, of which a great number are also sold at Carlisle and Perth. The principal sale of tups is held at Hawick towards the end of September, but there are also sales at Edinburgh, Muir of Ord, Lockerbie, etc.

Cast, draft, or cull ewes, at five years old, go from the hills into the low country and better food, to be "milled" or crossed with Border Leicester rams. The produce is called "half-bred," or "Leicester-Cheviot," and those half-breds kept for ewes, produce by a Leicester or other Long-wool ram "three-parts-bred" lambs. Half-breds, when fat at twelve to thirteen months old, weigh 16 to 18 lb. per quarter, and the flesh is leaner and of better quality than that of the pure Leicester.

The Cheviot breed was used many years ago for the improvement of the Welsh mountain sheep, and it maintains an excellent reputation in England, where large numbers of "cast" ewes are taken annually to cross with the various Down and Long-wool rams, to produce feeding hoggets, which are in high favour in the fat market. No sheep thrives better on the plains of the Canadian North-West; and, being hardier than any of our low country Long-wool or Down breeds, it has a hopeful future in other foreign parts, when quality versus quantity of mutton, and the cost of producing wool per pound, and not the amount per sheep, become more important factors than they are at present. The breed, which usually produces mutton of the finest quality, has one defect as a butcher's sheep, in the occurrence of more than the usual number of yellow carcases, which do not fetch top prices.

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[1] Reported in the *Journal of the Board of Agriculture*, London, August 1915.

With a view to the development of the foreign trade, the **Cheviot Sheep Society**, formed in 1891, established a *Flock Book*, Vols. I. and II. of which were issued in one cover in 1893. It makes the important announcement that: "It is only compulsory for the sire of tup lambs to be entered in the *Flock Book;* though every tup used in the flock must, by being the son of a registered sire, and descended from a ewe from a flock in which only pure-bred or eligible tups are used, be himself eligible for entry in the *Flock Book.* This rule will insure purity of breeding, and keep the size of the *Flock Book* within moderate bounds."

The following **description of the Cheviot sheep** is condensed from the *Flock Book :*—

"*The Cheviot tup* at maturity weighs, when fat, at least 200 lb. live-weight. He should have a lively carriage, bright eyes, and plenty of action. His head should be medium in length, broad between the eyes, well covered with short, fine, white hair; his ears nicely rounded and not too long [well up from the eye], and rising erect from the head [drooping or low-set ears or narrow ones, 'hare-lugged,' are markedly faulty]; nose arched and broad, and nostrils black, full, and wide open; neck strong, but not too long; breast broad and open; ribs well sprung and carried well back towards the hook-bones—(a long weak back being about the worst possible fault); back broad and well covered with mutton; hind-quarters full, straight, and square; the tail well hung and nicely fringed with wool; legs set well apart, standing squarely (hocks neither out nor in, the latter especially being looked upon as defective); the bone broad and flat, covered with short, hard, white hair; the fleece weighing 10 lb. to 12 lb. of fairly fine, densely grown wool of equal quality, meeting the hair at the ears and cheeks in a decided ruffle. Bareness there, at the throat or near the forearms, near the hocks, or below the body, or coarseness about the breeches, is a serious blemish. A hill flock of *ewes* should clip, on an average, 4½ lb. each of fine (washed) wool, stiff, straight, dense, and not too short. Hard feeding makes it stronger. The Cheviot should live and thrive well on the poorest keep, and when taken to the lower ground grow larger, and in time become fat."

Horns in the ram (Plate CLVII. A), though occasionally present, are now objected to, being considered a sign of softness. They are "clean," not thick and ringed or rough like those of the Blackface breed.

The tail is long, and it is usually cut so that the point reaches the hock,[1] but closer docking may become necessary with changes which are progressing in the systems of management.

The shoulders must be high, and sharp at the withers, to give style, but not too sharp—else the sheep is liable to be slack behind the shoulders.

The **fashionable form** of Cheviot is shorter, smaller, and more compact, and the wool closer and thicker set than formerly, since a series of bad seasons, down to 1879, showed that the larger, longer varieties with loose open fleeces were not so hardy.

For several decades before that time, beginning about the middle of the century, the so-called "improved Cheviots" were all the rage. They were developed by **James Brydon**, who died in 1887 (designated by himself "a man among sheep, but a sheep among men"), on the farms of (1) Moodlaw, Eskdalemuir (till 1869), (2) Appin, Tynron (Dumfriesshire), (3) Kinnelhead, and (4) the Holm of Dalquhairn. At his bi-annual sale at Beattock in September, from 1851 to 1876, highly fed and excellently dressed rams, numbering from 123 (in 1873) to 184 (in 1855), with beautiful form and stylish gait, were sold at high prices for those times, averaging round £10, and there was hardly a stock in the South country that was not impregnated with the blood. A few trying years of bad weather sufficed to show that in attaining size and beauty, Brydon had got on the wrong tack, and had sacrificed hardihood and utility—the two essentials in a mountain sheep—for sale-ring appearance. Border Leicester blood was erroneously said to have been introduced by him, but the pedigrees of the prominent sires bred to his Cheviot ewes could be traced all the time, beginning in 1851 from "Old Pollie," the first of the leading strain of Brydon's fashionable sheep. "Craigphadrig," who realised £194 in 1867, the highest price touched, was a magnificent sheep; but his wool and that of his grandson "The Duke" were like that of a Border Leicester, and, curiously enough, "The Earl," son of the former and sire of the latter (both Highland winners) had a good typical Cheviot coat. The appearance of Border Leicester character no doubt lent colour to the belief that a cross of that breed had been introduced, and the occurrence was probably due to reversion to a much earlier cross, as **Patrick Sellar**,

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[1] The tails of mountain sheep are usually left long to protect the udders in cold weather, and because, on natural food, they are not so liable to scour and become dirty behind as sheep on turnips and luxuriant green forage. The tails of Shetland and Iceland sheep are not long enough to act as a protection, but there is an unusual amount of wool on the inner thighs, which serves the purpose equally well.

Morvich, Sutherland, one of the foremost sheep farmers in Sutherland, wrote in the *Farmers' Magazine* (1820): "The Cheviot breed has been much improved within the last fifty years by crossing with sheep recommended to the Border farmers by Bakewell. In some cases (perhaps too many), it has got a little dash of the Leicester blood in it." Robson of Belford, "the great improver of the breed," was said by his grandson Robson-Scott of Newton, to have introduced rams from Lincolnshire.[1] The Long-wool of that day would no doubt be a hardier animal than that of the present time, a cross of which would now destroy the hardiness of any mountain breed. The mistaken practices of intense in-and-in breeding and overfeeding were quite sufficient of themselves to accomplish the wreck which entailed a widespread heavy loss on the Cheviot sheep-breeders of the South of Scotland. Brydon began before 1860 the practice of housing the ram lambs during winter. The old rams went into the house when they came from the ewes. At first, but not latterly, a good many of his best sheep had a yellow tinge on the legs and faces.

The sheep bred from Brydon's rams grew long and lanky, and the coats were open and watery; and, worst of all, the ewes became very lean in winter, developed into bad milkers, and in consequence deserted their offspring, which, being naturally soft, made a very short struggle for existence. With all their bad qualities they were very prolific, as many as from one-half to two-thirds of the ewes on good "hefts" (see p. 607) producing twins, half of which had to be killed in bad seasons.

The original unimproved Cheviot was a very close-coated, short-wooled, and remarkably hardy sheep—even more hardy, it is recorded, than the Scotch Blackface. The ewes of the present day are good milkers, if not starved, as they frequently are in bad seasons, when the natural food on which they subsist is late in springing. They are all the hardier and better doers under stress of weather if they do not show too much high breeding, and have a slight yellow tinge on the hair of the head and legs, after the colouring of the old Tanfaced breed of the country. Any redness about the eyes and ears or whiteness on the muzzle is an indication of softness.

Marketing of Rams and Ewes.

The following is an excerpt from a **Memorandum** by the Author on the unnatural and **wasteful practice** of selling Cheviot tups in two years' growth of wool, suggesting Government interference as a war measure in 1918. The suggestion was turned down because the object was too small for official notice.

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[1] *Border Breeds of Sheep* by John Usher, Stodrig, Kelso. See also "Cheviot Sheep," by John Robson, in the *Scottish Journal of Agric.*, Jany. 1922.

"In 1917 there were sold at Hawick about 580 Cheviot tups (shearlings) for breeding purposes, and probably in all 800—including sheep sold privately and at Lockerbie Auction. The average clip would be about 10 lb. each, and the old and wasteful practice of dressing in a two years' fleece of wool is still maintained. The object of retaining the extra wool to make a defective sheep look better than it is, is wrong from every point of view. It is detrimental to the sheep and wasteful of wool, as well as of probably half the time of the most experienced shepherds snipping the tops off the fleeces, 'dressing the sheep' for market during the months of August and September, when they ought to be securing hay for their flocks in winter.

"Dressing for local shows was stopped by the owners of Exmoor sheep themselves more than ten years before 1918.

"Under a Government prohibition there would be no injustice to any one, as all would be made alike, and much time and money needlessly spent would be saved. Moreover, the year's fleece of some 800 sheep would be made available in June, a year sooner than under the present system."

The late Wm. Barber, of Terreran, Dumfriesshire, when Superintendent of Live Stock to the Board of Agriculture for Scotland, compiled and published in the *Transactions of the Highland and Agricultural Society in* 1914, under the title of "Breeds of Scottish Sheep, I.—Cheviots," a very full compendium of the history of the breed, quoting the various authorities as far back as 1372, "when large tracts of the Cheviot hills are described as covered with a small but very hardy race of sheep." In the early days there were dark-faced or brocket-faced Cheviots noted for "hardiness, milkiness, and self-reliance," but previous to 1792 the breed was known as the "white-faced or long" sheep. It was late in the eighteenth century before the name "Cheviot" was used. It is suggested that the fine wool of the Cheviot was derived by imposing the Merino on the original sheep of the Border mountains, after the dispersal of George III.'s Merino flock, which had been developed and strengthened by importations made in 1787 and again in 1791. Another possible source is indicated by Douglas in the *Farmers' Magazine*, 1803, "by means of rams of the Southdown or Hereford (Ryeland) breed, or those with a dash of Spanish blood in them." The "Ancient Race," or the foundation stock of the country before improvement (which is reputed to have begun about 1760 with a dash of Lincoln blood) consisted, according to Sinclair, "of two branches, one with light thin body and long tail (like the Cheviot), with varying colours of wool, face and legs; the other either akin to or the same as the Scandinavian race, the peculiar feature of which is the short, almost triangular, flounder-like tail." After 1814, Sinclair reports that "breeders of the present day have had recourse to no other means of improvement than careful selection."

The same course of action as that taken in the establishment of other successful sheep breeding industries, seems to have been quite unconsciously followed; an extremely hardy but comparatively worthless breed, capable of adjusting itself to adverse circumstances in its surroundings, was gradually improved by the introduction of finer bred but less hardy kinds of sheep. An example is given in *Sheep, Husbandry, etc.*,[1] which says: "The flock furnishing the best wool in Australia (Captain M'Arthur's) is composed of grade sheep—Bengal (hairy fat tails) and English (George III. Merinos) mated up with Merino and Saxon Merino rams." The differences in the views expressed as to the comparative hardiness of the whitefaced and the blackfaced sheep is to be accounted for by the different degrees of improvement developed at different times. After the Cheviot had actually become less hardy than the Blackface, its constitution was improved by large numbers of Blackfaced flocks being replaced by Cheviots through the use of Cheviot tups—during five or six generations—a practice followed owing to the greater value of Cheviot wool, but also owing to the impossibility of getting sheep to live that had not been bred on the unhealthy land in certain districts.

In the records of Cheviot sheep, Varney's evidence before the House of Lords in 1828 states that "Cheviot wool is deteriorated very much in point of hair, and will not make fine cloths now, as it once would. It is coarser and longer, a state attributable to the Cheviot having a partial cross of the Leicester." He might well have added, or of the Blackface heath breed.

Sir John Sinclair, the patron and early advocate of the Cheviot, formed in 1791 the British Wool Society with the object of improving the quality of wool, and its Directors visited various districts where sheep were bred. In this way the outstanding merits of the Cheviot as a fine-wooled mountain breed were discovered, and it promised to be of all the breeds the most valuable. This led to the introduction of Cheviots into Caithness and Sutherland in the last decade of the eighteenth century.[2] After successful experiences in crossing into Cheviots from Blackfaces at Polmoodie, on the Annandale Estate, begun by David Irving in 1785, the change took place so rapidly that, as Barber records, "about the end of the eighteenth century, and before the nineteenth had run half its course, the Blackfaces disappeared from nearly all the best farms in the South of Scotland, except in the higher districts of Ayrshire and Lanarkshire." The balance between the two breeds was again modified by the remunerative practice of producing cross-bred lambs on the better kinds of Blackface ewe grazings, by the use of Yorkshire (Wensleydale) rams and latterly of Border Leicester rams.

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[1] By Henry S. Randall, LL.D., late Secretary of State of New York State (N.Y., Orange Judd & Co., 1882).

[2] See Appendix B 1.

Sir John Sinclair refers to the Cheviot in 1792: "Their limbs are of a length to fit them for travelling, and enable them to pass over the bogs and snows which a shorter legged animal could not penetrate. They have a shorter, closer fleece, more portable over mountainous pastures than the Tweeddale and Leicester breeds, which keeps them warmer in cold weather, and prevents either rain or snow from incommoding them. They procure their food by scraping the snow off the ground with their feet. Their weight, when fat, is from 17 lb. to 20 lb. per quarter; and, when fed on heath and kept to a proper age, their meat is fully equal in flavour to any that the Highlands can produce." He also gave the following example of the superiority of Cheviots over Blackfaces: "Thos. Scott on Carter Fell, a mountain 1600 feet high, exchanged in 1776 with Walter Hog, of Ettrick Forest, five whitefaced for as many blackfaced rams, but had every reason to regret the experiment, which was far from being the case with Mr Hog."

Youatt, discussing the respective merits of the Cheviot and the Highland Blackface, says: "The Cheviot is by far the more contented of the two on whatever kind of pasture he may be put. It comes to maturity a twelvemonth at least sooner, and will ever leave the Blackface far behind. A very great proportion of Scotland is now exclusively employed in the rearing of sheep; and there are very few parts of the South Highlands at least in which the Cheviot has not superseded, or is not rapidly superseding, the native Blackface sheep. The Cheviot, however, did not always weather the inclemency of a Highland winter; and the loss of the ewes and lambs almost—and in some cases more than—balanced the advantage of finer wool and early maturity. In the power of endurance there is no doubt the Blackface sheep claimed a decisive victory, and on the wildest of the Grampian pastures no other stock can exist but the Blackface.

Lord Napier testified before the House of Lords that the Blackface sheep had been driven out of the whole of Selkirkshire, including Ettrick Forest, and substituted by the Cheviots. Patrick Sellar further records that after their introduction into the more Northern Highland counties about

1790, first by Sir John Sinclair, and then by Lord Hopetoun and others, "a very rapid increase of Cheviot sheep took place in Sutherland, between 1805 (when they numbered a few hundreds) and 1820, resulting in the annual extraction from the Alpine plants of 20,000 carcases of mutton and 100,000 fleeces of wool." They replaced a few Highland "kyloes" of a very inferior although hardy type. Clearances of the small farmers and crofters were necessary to make room for them, but primarily to save the Gaelic-speaking people who had been increasing in numbers beyond the capacity of the country to support them, and who suffered from periodic famine and outbreaks of typhus fever following the frequent blighting of the potato crop which had been recently introduced to supplement the insufficient corn crop of the country. A full statement of the deplorable condition of the county of Sutherland is given in *Loch's Account of Lord Stafford's Improvements*, Part I. (Appendix V.)[1]

"About this time on the more sheltered grazings of the Grampians, Cheviot sheep were tried and did well, because they were found to pay better than the native sheep when the land was adapted for them. The Blackfaces maintained their ground in the West of Scotland and the Isles, and in parts of the Southern mountains, and they were numerous in the North." In 1812 a correspondent writes of the Tweeddale district: "The rage for introducing the Cheviot breed of sheep, and of course the taking of sheep farms, has greatly subsided, partly from the low price of that kind of wool, and partly from the great losses sustained by a number of sheep farmers in changing their stock to that breed, and from great risk in bad lambing seasons. The spring of 1812 was a bad one, and with some Cheviots there was a loss of 40 to 50 per cent. of lambs, and the difference against the Cheviot as compared with the Blackface is put down at 15 to 20 per cent. of less lambs." (See Appendix B 1.)

The following interesting account of the breeding of **Merino sheep in Scotland**, and the introduction of Merino blood in the formation of the so-called Caithness variety of the Cheviot sheep, is taken from a letter dated 1st May 1820, by Patrick Sellar to James Loch, Agent on the Sutherland Estates.[1]

"The Cheviot sheep is a true moss and mountain sheep; when left to themselves as they ought, as much as possible, in such a country to be, they scatter and straggle in threes

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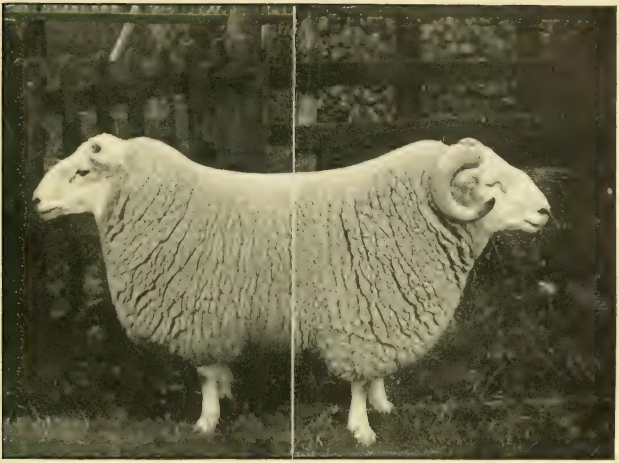
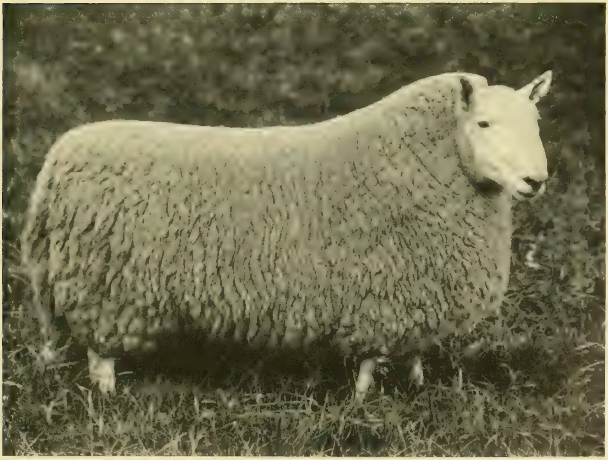
[1] *An Account of the Improvements on the Estates of the Marquis of Stafford in the Counties of Stafford and Salop and on the Estate of Sutherland, with Remarks.* Part I., Sutherland, Appendix No. VII., 1820. Reprinted 1908 by Waterlow & Sons, Ltd., Westminster, S.W. See p. 662.



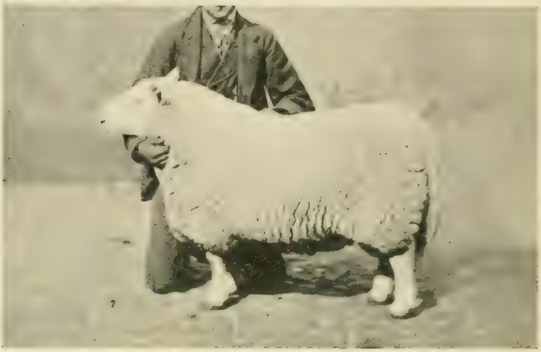
A. Cheviot Ram Heads, to illustrate Types.



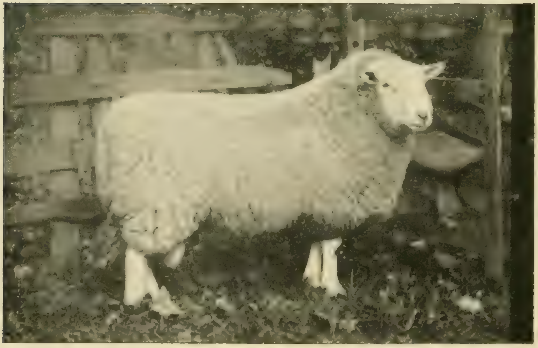
B. Cheviot Dinmont, "Dignity."
Bred by John Elliot, Junr., Blackhaugh, Clovenfords.
Breed Champion, Aberdeen Highland Show, 1920. Sold at the record price of £1200.

[*C. Reid, Wishaw.*

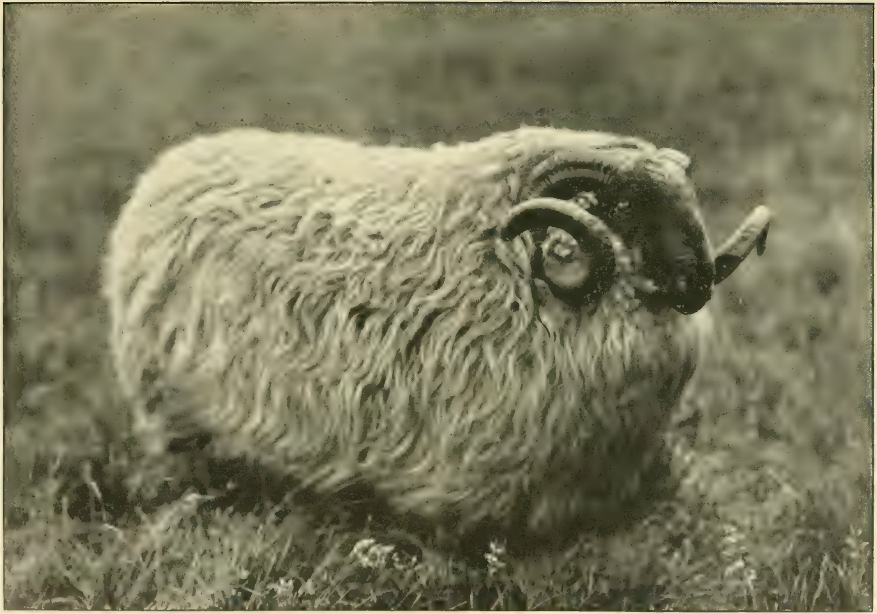
CHEVIOT RAMS OF THE MID-NINETEENTH CENTURY



A. Cheviot Tup.
Bred by Johnstone of Caplegill, Moffat, in Brydon's time. Owned by the Brothers Shields.

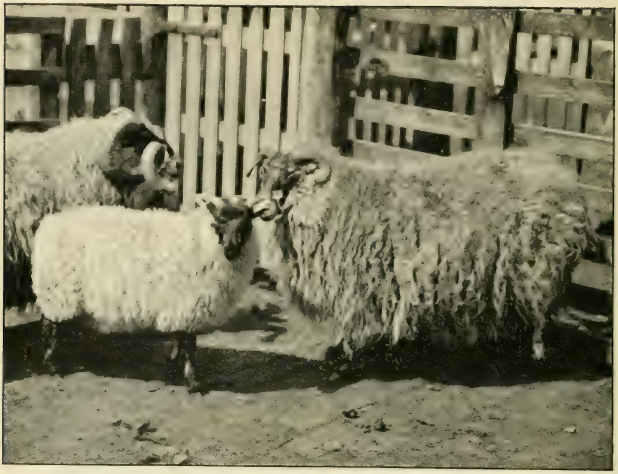


B. Cheviot Shearling Tup.
Bred by the Archibalds, Duddingstone, South Queensferry. First at Edinburgh Ram Show in 1874.

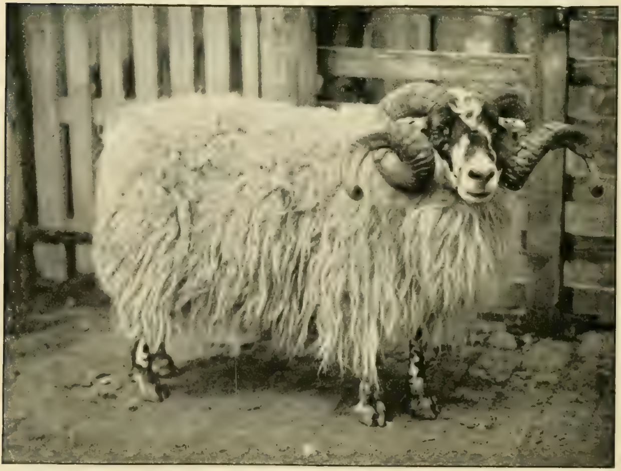


Scotch Blackface Mountain Ram, “Morning Sun of Glenbuck.”
First prize Shearling at Dumfries H. & A. Show, 1903.
Bred by Charles Howatson, of Glenbuck, and used as Champion Stud Ram, season 1903-1904.

[*Brown & Co., Lanark.*

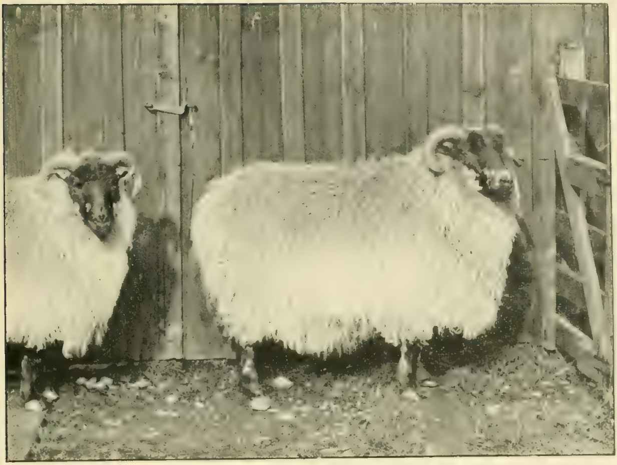


A. SCOTCH BLACKFACE RAM, "OLD GLENGLAS," at 17 years old, and ewe at 14 years, with her lamb by him.



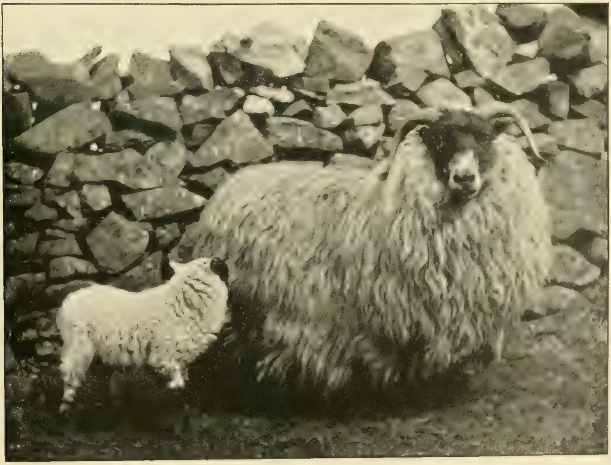
B. SCOTCH BLACKFACE RAM, "OLD GLENGLAS," at 17 years old.
Bred by Daniel Craig on Glenglas, Sanquhar, and drowned in 1901, when 20 years and 3 months old.
He was wintered out till 16 years old, and he was sire of four lambs at 19.

[*Both by Andrew Miller, Cumnock.*

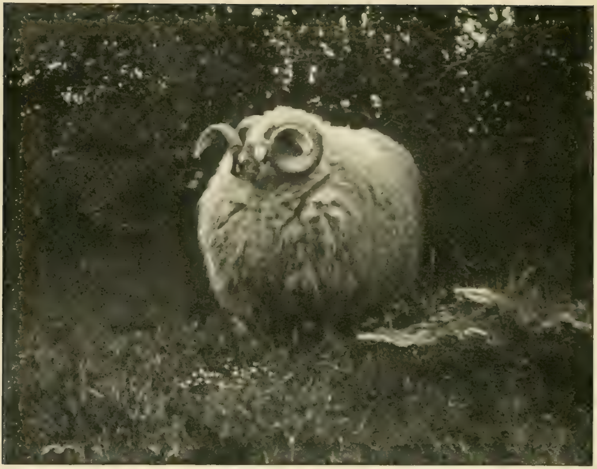


A. Scotch Blackface Ewes for Ram Breeding.
Bred by John Craig, Innergeldie, Comrie, Perthshire.

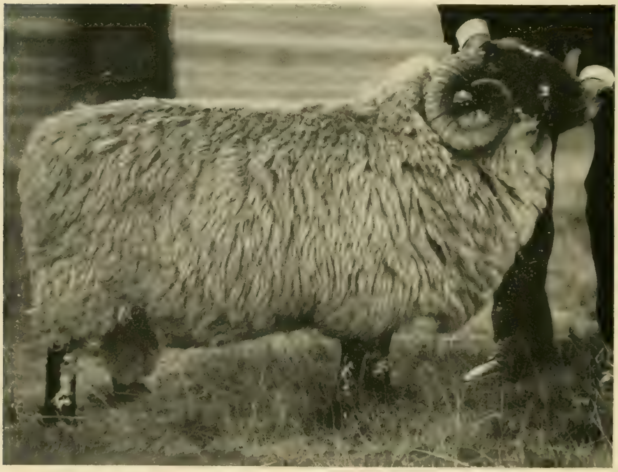
[*J. Trotter, Crieff.*



B. Scotch Blackface Ewe and Lamb.
Sire a £50 Cadzow ram, and dam a Glenbuck ewe.
Several first prizes at Moffat.
Bred, owned, and photographed by the late D. A. Macarthur, Nunnerie, Abingdon, Lanarkshire.



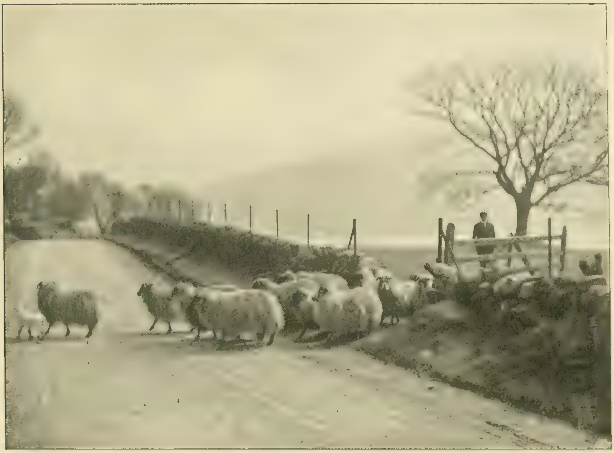
A. SCOTCH BLACKFACE RAM, "SANDY HOLE."
Bred by James Craig of Craigdarroch, and photographed at 3 years old, when his fleece weighed 15½ lb.



B. BLACKFACE SHEARLING TUP.
Owned by D. & T. Lindsay.

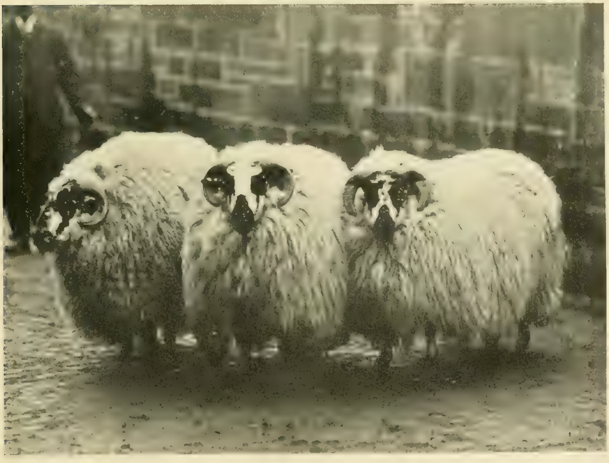
[*"Agricultural Gazette Photograph."*

PLATE CLXIII.



A. Blackface Ewes and Lambs from Milton, Callander, Perthshire.

[*P. J. Stirling Boyd.*

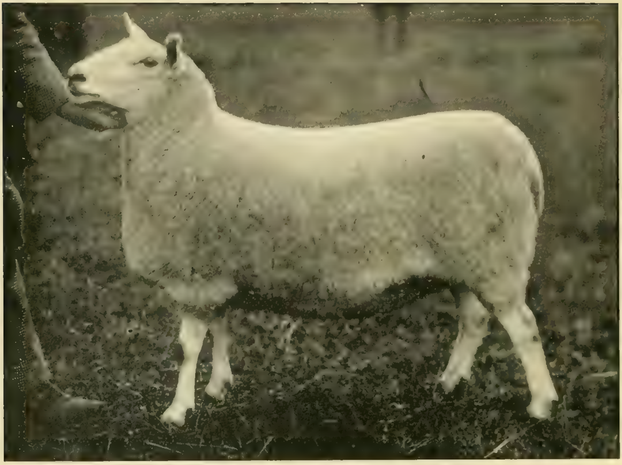


B. Scotch Blackface Shearling Wethers.

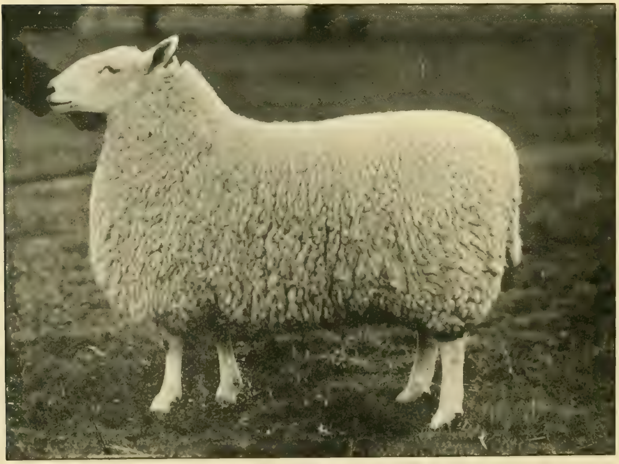
Weight, 5 cwts. 3 qrs. 14 lb. Champion Cup for the best pen, Scottish National Show, and the "John Clay" Challenge Cup at Smithfield, 1904. From Inverquharity ewes by a Glenbuck ram.

Fed by John M'Dowall, Girstingwood, Kirkcudbright.

[*Brown & Co., Lanark.*



A. HALF-BRED (LEICESTER-CHEVIOT) EWE (3-SHEAR).
President's Medal for best H.B. Sheep, Dumfries Highland Society Show, 1903.
Bred and shown by J. A. W. Mein, Hunthill, Jedburgh.



B. HALF-BRED SHEARLING RAM.
Champion at the Highland Show, and many other prizes.
Owned by A. & J. K. Smith, Leaston, Upper Keith, E. Lothian.

[Photos by Brown & Co., Lanark.

and fours over the waste, and a score of them is rarely to be seen together. The Merino sheep (see p. 661), which I have bred pretty extensively in the Highlands, is of quite a different nature. They are decidedly *mountain* sheep but not *moss* sheep. When pinched for food they resort to the Alpine plants which grow in the peat-bog, but they will not do so of choice. They range all in one lot, that is, of whatever number the flock or hirsel consists, it is found all in one place, feeding like a drove passing through a country, and they are either on one of the spots of fine grass in the mountain, or travelling from one of these to another. Nothing will induce them to do what the shepherds call "lying abroad" upon the waste, or to mingle with sheep of any other kind. After taking their walk every day over their range of pasture in the way I have described, they form a sort of camp at night on the highest part of their ground, and may be certainly found there at daybreak next morning, lying so close that they touch each other, the strongest sheep outside and the weak in the centre. Owing to this disposition of the Merinos, they are not suitable to these wastes of peat-bog; not that they don't thrive there and yield wool in abundance, and of the first quality; but that, as three fourth parts of the wastes consist of Alpine plants which they reject, the same quantity of Sutherland ground will keep three hundred Cheviots, that will maintain one hundred Merinos, and that with one-half the care, and one-third part of the risk in winter. I have *bred* up my Merino flock from two hundred to six hundred of as fine sheep of the kind, and as thriving too, as ever stepped on hill ground. They got no hand feeding; nothing beyond their own finding during last winter, except about six acres of inferior turnips at Morvich to the hoggs and fourteen days' hay during the depth of winter. They have paid me very well; their mutton at five years old is fine, marbled, and high-flavoured, and everybody we tried to take in with it said it was the best mutton possible; yet, I am about to **cross them into Cheviot**, and that on this account, that they are not the kind that will suit as a general stent for Sutherland. They won't pay in Strathnaver, for instance; and, in *breeding*, they interfere with my more extensive and important flocks, which are the genuine *moss sheep*, that will pay for improvement in Sutherland, and that will convert not only the fine grass but the Alpine plants into wool and mutton."

The shape and hang of the ear of the Sutherland Cheviot, together with its finer wool, larger size, and less hardy constitution than the Cheviot of the Border country, all serve to indicate that an appreciable amount of Merino blood has been introduced.

An attempt which failed was also made to refine the quality of the wool by the use of South Down rams. All went well during a few mild seasons, but a severe winter came, and all the cross progeny died off. As a result of what is believed to have been an earlier unsuccessful attempt of the same kind, a dun or brown-headed lamb now and then appears in the Skibleers Cross Cheviots. It would appear that about the beginning of the nineteenth century there was a craze for the so-called improvement of the wool of mountain breeds by the introduction of South Down rams, an effort which failed as similar recent efforts (in 1920-22) to improve Blackface wool by a South Down cross have failed, because the crosses cannot survive the exposure under hill conditions.

Barbour focussed the pre-war merits of the Cheviot breed as a mutton sheep in a pregnant paragraph as follows:—"In the Carcase Competition at Smithfield, in 1913, Cheviot sheep had conspicuous success. In the class for 'one pure, long-wooled wether sheep above twelve, and not exceeding twenty-four months old,' there were 16 entries—12 Cheviots, 3 Welsh, and 1 Blackface. So good was this class as a whole, that while the 1st, 2nd, and 3rd prizes were awarded to Cheviot carcases, every exhibit received a commended ticket—a totally unprecedented thing at Smithfield."

The Cheviot breed is always well to the front in the Championship Competitions, not only at Smithfield but at the Scottish National Fat Stock Show in Edinburgh, where John M'Dowall of Girstingwood; T. Bartie, representing the Dundas Castle; and J. T. MacLaren, the Dalmeny flock; are conspicuous in the exhibitors' lists. A record for the latter flock was made in 1912 by a lot of 200 Gordonbush wether lambs bought in September at Dingwall for 20s. each to test the breed's capacity for development. Wintered at Rosebery, and grazed at Dalmeny after April 1913, they clipped 4¾ lb. each of washed wool, which sold at 1s. 3d. per lb. One half of the hoggs were sold in the end of October for 53s. each, and the second half early in November at 52s.

The **Scotch Blackface Highland breed** is smaller and hardier than the Cheviot, and it thrives better on coarse pasture, such as black, heathery, and moory land.

Points.—The face and legs are black or mottled ("brocket") (but the colours should be distinct, clear, and free from dun or brown), smooth and glossy. Black on the face is in favour with those who breed cross-lambs, to make the lambs dark, as they sell better in consequence, although ewes with black faces are reputed to be sometimes hard and slower feeders than those with mottled ones. The favour for all-black faces in rams has been declining, owing to there being a correlated tendency to produce more black in the fleece. No wool should appear among the hair, although the remains of a tassel on the forehead and of fringes on the cheeks and legs have often to be dressed-off well-bred sheep in preparing for exhibition. Such sheep are liable to be soft in constitution and they travel badly in snow. The nose is strong (broad) and prominent, and the nostrils are wide and black. The horns of the ram are large, coming out level from the crown of the head, and not rising above it or joining together at the base, but taking one or more spiral turns according to age. The corkscrew-like curl of the horn is in a forward direction, and should so incline that room is left between the horns for the face. The points, sometimes extending to half of the horns, have to be cut off old rams to let them reach the ground to feed, to free the jaw from pressure when horns grow too close and cut into the face, or to lighten them before going to work on the hill. Three inches were sawn off the horns of "Old Glenglas" (Plate CLX.) to let him graze. In the ewe the horns, which also spring horizontally, are small, thin, flattened, and curved, but not spirally twisted.

The ears are short and small, but hidden by the horns in the ram, and not much looked to in judging. The back is broad all the way along, and the shoulders formed for freedom of action, like those of the trotting horse. The tail is naturally short, not often hanging lower than the hock, and it is not usual to dock it. But fashion is changing, as no tail is necessary on modern sheep, which are so rough below; moreover it grows inferior and often dark wool. The late James Craig of Craigdarroch had a strain of Blackface sheep with tails so short that they were often rejected for breeding in consequence. Had the short disposition been encouraged, the tail might have been still further reduced, and in time probably got rid of. The mutton is of the finest quality, especially that of three-year-old wethers, or young and tender lambs. A good fat wether from the hill at three years-off should weigh 15 to 16 lb. per quarter.

The Blackface sheep, when thriving best on pasture, must travel about a great deal, a habit which adapts it to its native pastures better than to a low country district, where it is liable to be affected with foot-rot. In spite of its activity, no breed settles better under cover for house-feeding than the Blackface, whether it be represented by ram lambs for breeding or "milled" ewes for feeding.

The wool is wavy, loose, and shaggy, hanging down nearly to the ground, stronger and more hair-like and kempy than Cheviot wool. It is specially valuable in the manufacture of coarse articles, such as carpets; and, as it is less subjected to foreign competition than other wools, it fluctuates less in price. The former ratio in price, *i.e.*, half the value of Cheviot wool, had before the World War been altered by Blackface wool selling at a relatively higher figure. The ewe fleece averages 4 lb. up to 5 lb. for the best hill "running-flocks" (ewe and hogg), and up to 7 lb. for two-year-old and three-year-old wethers. It is usually clipped unwashed. Much used to be exported to America when the price did not exceed 6d. per pound. Black or blue spots on the neck, tail, or other wool-producing parts of the skin of a Blackface sheep are increasingly objectionable.

Blackface Hill Sheep.—Low's graphic description of the **home of the Highland Blackface sheep**, under the name of the Blackfaced "Heath" (or the "Linton") breed, is worthy of reproduction and close study. He says:—"From the high lands of Derbyshire on the south, to the confines of Scotland on the north, extends a chain of rugged heathy mountains, whose summit ridge separates the waters of the Tyne, the Tees, the Swale, the Wharfe, and other rivers which flow to the eastward, from those of the Ribble, the Lowther, the Lune, and others which flow westward. The elevation of the tract is from 1200 to 3000 ft., the highest summits being Cross Fell, near the sources of the South Tyne and Tees, in the eastern part of Cumberland; Skinner Fell, on the confines of Yorkshire and Westmorland; Wharnside and others in the westerly part of Yorkshire. This central chain is separated from the yet higher mountains of Cumberland and Westmorland on the west, by the beautiful vales of Kendal and Eden. The tract is destitute of boldness and grandeur, and, towards the east, passes into the tame moors of Northumberland, Durham, and Yorkshire. This dreary tract is generally covered with coarse heaths, mixed with sedges, rushes, and the less nutritious grasses[1]; and, from being exposed to the winds of both the eastern and western seas, possesses a cold climate. It has given rise to a race of sheep now very widely diffused. This race has been termed the Blackface Heath breed, a name which, though it does not distinguish it from some of the Forest breeds, may be retained, as indicating its peculiar habitat in a country of heaths. It is chiefly found in the more northerly division of the chain of mountains referred to, beginning in the heathy lands of Yorkshire and Lancashire. It extends across the vales of Kendal and Eden to the higher mountains of Cumberland and Westmorland on the west, and by the Carter Fell into Scotland, where it occupies the great range of greywacke hills stretching from St Abb's Head on the east to the Irish Channel on the west. It stretches through the upper part of Lanarkshire into Argyllshire, and all through the Highlands of Scotland, from the Grampians to the Pentland Firth. It has spread to all the Hebrides, and even to the islands of Orkney and Shetland."

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[1] See page 609, and an article on "The Natural and Artificial Food of Scotch Hill Sheep," by the Author and Professor Kinch, in the *Highland Society's Transactions*, vol. xvi. Reprint, Oliver and Boyd, Edinburgh, 1917.

The **sheep described by Low** in 1842 and **Youatt** in 1837 is now represented by at least seven very distinct sections which might rank as separate breeds, modified by local surroundings and different methods of treatment, and no doubt to some extent by crossing with other breeds. These are:—

> (1) The Scotch Blackface Highland; (2) The Lonk; (3) The "Rough" sheep, a mountain breed; (4) The Dales breeds, represented by the Swaledale, probably the purest and most important of them; (5) The Derbyshire Gritstone; (6) The Penistone breed; and (7) The Limestone breed.

The last two have undergone the most striking change, viz., from the black or mottled face and legs to white. The rest, with one exception, are very similar to each other in the colour of the hair on their faces and limbs. Youatt says, "The moorland sheep are horned and have black or mottled faces and legs. Their horns spread wide, and they bear much resemblance to the Norfolks. The covering of their buttocks is mere hair, resembling the shag of the goat more than the wool of a sheep; but this is considered to be a mark of hardiness."

Culley, one of the oldest and most reliable authorities, refers to the dun or **Tanfaced sheep** as the early occupants of the high mountain ranges of the North of England and parts of Scotland, which were in his day the territory of the Heath breed. "Their faces (and legs) were of a dun or tawny colour; the wool fine, and mixed, and streaked with different colours. They were hardy and required little trouble; polled, small in size—weighing, at four or five years old, not more than 7 lb. or 8 lb. per quarter, but in every essential quality, except the fineness of the wool, they were far inferior to the Blackface."

The exceptional fineness of the wool, which weighed less than 2 lb. each, was recorded as far back as 1460, when, or soon after, the breed "prevailed in Annandale, Nithsdale, and Galloway. It lingered longest in some of the mountainous parts of Aberdeen," and was known in Fifeshire into the nineteenth century.

Youatt suggests, in accordance with tradition, that the Blackface breed is of foreign origin, and that it was taken to a Royal farm in the forest of Ettrick by one of the Scottish

Kings (James IV., who married the daughter of Henry VII. of England); but **Low** (edited) favoured the more probable view that it "found its way into Scotland from the mountains of the North of England. It has been, for an unknown period, in all the high lands of the counties of Dumfries, Berwick, Roxburgh, Selkirk, Peebles, Lanark, and adjoining districts. Its introduction into Argyllshire and the Central and Northern Highlands, has been of very recent origin, or about the middle of the eighteenth century, when sheep began to supersede the herds of black cattle, and by degrees it also displaced the aboriginal Tanfaced and the Four-horned breeds of the Western Islands. [Coleman says it did so in a great measure by absorbing them through crossing, and that the hardiness and extraordinary activity of the Blackface ewe from the North of Scotland was largely due to the presence of the Tanface breed.] It (the Blackface) resembles the **Persian** sheep in some respects, but the essential characteristics are no doubt the result of natural development under the conditions of soil and climate in which it has existed for hundreds of years. Horns are occasionally absent in the females." [The Author remembers having seen this peculiarity on the Farm of Blair, Ayrshire, soon after 1870, and which probably originated from the hornless Tanfaced connection.] "The fur is shaggy and the wool coarse, in which respect it differs from that of all the other mountain breeds of the country. It is of medium length, and weighs about 3 lb. the fleece, when washed. Although wild and independent in its habits, the Blackface is not so restless as the mountain sheep of Wales. The weight of the four-year-old wether is 60 lb. The mutton is more juicy and more venison-flavoured than that of Welsh sheep or Southdown. This sheep finds subsistence beyond the ordinary range of other sheep, not being so nice in the choice of herbage as most others, and feeding much on the shoots of heather. The breed, extending over a great variety of situations and soils, from the moist moors of Yorkshire and other parts to the rocky mountains of the North of Scotland, presents a great diversity of size and aspect. The best are found in Tweeddale in Scotland [a distinction which was later transferred to Lanarkshire, and finally shared by other districts]. The sheep on the hills of Cumberland, Westmorland, Yorkshire, and Lancashire are much inferior to those of the Border counties of Scotland. The only food supplied is what the animals can collect on their natural pastures, including a little coarse hay during deep snows. No permanent improvement for their home conditions by crossing with other races of sheep has been successful." Nevertheless, the changing of a Blackface into a Cheviot stock by the constant use of Cheviot tups, and *vice versa*, was a common and successful practice during the early period of competition between the two breeds.

Aiton (1824) says: "This breed of sheep is the boldest, the hardiest, and the most active and industrious of all the sheep species. They are so round of their bodies, so compact in their figure and short coupled, that they are often denominated the 'Short' sheep."

According to Sir G. Mackenzie's *Survey of Ross* (1810), the Blackface breed was first introduced into the mountains of Ross-shire by Sir John L. Ross of Balnagown about the year 1775. They were first bought at Linton in Peeblesshire, and were for a time called the Linton breed, but came later from Perthshire. It was several years before they were really established, owing to the hostility of the people, who, with their Black cattle, were removed to make room for the sheep. One Geddes from Perthshire took the farm from Sir John about 1782, and was believed to be the first sheep farmer who settled in the North.

Sheep Stock Valuations.—The proprietors of the North and West of Scotland found sheep pay much better than any other stock, and encouraged sheep farmers to lease and to stock the land; and the system soon spread. Owing to the large proportion of young sheep which died when brought on to the hill land in Argyllshire and many other districts of the West Highlands and other places (as compared with sheep bred on the ground), it became an almost universal custom in letting a farm to tie the sheep to it in the contract made by lease—the stock to be taken over from the tenant at the termination of a lease at a valuation made by a representative of each of the two parties concerned, and an "oversman," or umpire. The prices paid were at first reasonable, and in accordance with the advantages gained by the sheep being kept on the land; but all the area to which valuations applied, especially in the Southern Highlands of Scotland, was not deathly country like the West Highlands, and still the prices all went up in the prosperous times for sheep farmers, until in many places in the seventies from 10s. to 20s. per head more was paid for sheep at valuation than they were worth in the market. These proportions did not adjust themselves as market prices of sheep produce fell, and farmers' outlays for wintering increased, till at the present day the extra sum the proprietor has ultimately to pay for the stock does not fall far short of the reduced capital value of the land. The removal of the sheep from the land turned into deer forest about the end of the nineteenth century, was in a great measure due to the fact that, on much of the mountain land where the death-rate of sheep was high, sheep would no longer pay the farmer to keep, even if he had no rent to pay (see the Welsh custom, p. 624).

Within the last quarter of last century a very **strong-wooled variety of the breed** was developed by Charles Howatson of Glenbuck, the Cadzows of Boreland, and other breeders who followed similar lines. Immense fleeces are produced on sheep receiving abundance of food, as shown in Plate CLIX.; and this strain does not fatten so readily as one with a shorter and closer fleece. For a time the kemp-free strong-coated sheep held the field, practically undisputed, against the older and more woolly variety; but, by the end of the century, a division of opinion had arisen, and many thought the length and strength of the wool had been carried too far, and that the long wool, especially associated with short legs of the fashionable showyard sheep, was a serious disadvantage in snow, and a danger which met the first lambs of young ewes—many of which, born away from assistance, died without finding the mother's teats. Rough-bellied sheep are also declared by many to be, as a class, inferior milkers. These authorities further insist that the coat of the hardiest sheep is one with good soft wool, short and thick, with a bit of kemp showing on the back, nature's ideal covering—a combination of hair and wool, seen to perfection in the Shetland and the Faröe Islands breeds, and also in Herdwick and Four-horned St Kilda sheep.

The **advocates of strong coats** of wool have been :—Charles Howatson, of Glenbuck; Matthew G. Hamilton, Woolfords; Charles Cadzow, Boreland, and James Cadzow, Gavinburn; James Clark, Crossflatt; T. Scott, Bogside; T. Hope, West Brownhill; D. M'Dougall, Dall; Wm. Mitchell, Hazelside; Maclaren, Shield Brae. **Those** who have gone in **for all-wool coats** are :—Adam Archibald, Overshiels; Turnbull, Burncastle; Arch. Whyte, Spott and Glenmoy; Peter M'Intyre, Tighnablair, and Jas. Craig, Innergeldie. Such woolly fleeces cannot be shorn in early spring to come out satisfactorily at the September ram sales, as they "batten" together. This encourages ram breeders to incline to an open, strong coat.

The advocates of fine wool *versus* strong wool do not want a short coat like that of a Cheviot sheep, but a thick-set mellow wool of good length, and as uniform as possible all over the body. Captain Jas. Craig, of Innergeldie, Perthshire, and Adam Archibald, of Overshiels, Stow, have many so-called "all-wool" sheep of this kind in their flocks, and some have in recent years been gaining prizes at the leading shows.

"Sandy Hole" (Plate CLXII.), bred by the late James Craig, of Craigdarroch, was a good example of this class of sheep. He was photographed at Polqueys, at four years old, in June

1869. The fleece, shorn immediately after, weighed 15¾ lb. He took 1st prize at the Highland Society Show in Aberdeen in 1868, in the hands of the Archibalds, of Overshiels, who used him twice with great advantage and considered him the best sheep of his day.

An important feature of the best of this variety is that they continue to yield heavy fleeces when they are old—a quality which should take a first place in selecting rams to rear for breeding.

The housing of Blackface ram lambs in winter was originated by James Greenshields, Westown, Lanarkshire. He once wintered about 160 tup hoggs in the fields without turnips, giving a moderate allowance of artificial food. About forty of them picked at their food, and refused to eat enough to produce a rise of new wool sufficient to admit of clipping in the end of April—at that time thought to be early. As an experiment the shy feeders were put in a large, well-ventilated shed, and they took to their food immediately, and in a week or two throve so rapidly that they began to spring in the horn, and, on the same amount of food, speedily overtook their neighbours in the field. From that time onward each season's lot of lambs has been housed in the last week of November with most satisfactory results. There have been fewer casualties, and bent or rickety legs; and no rheumatism, which was not uncommon among those wintered out. There was no cramming such as is now too frequently practised, with about 1 lb. each of mixed maize and cotton-cake, new milk, cod-liver oil, and as much chaffed rye-grass hay as they can eat. **Overfeeding** is a recent development in a very wrong direction. It began with the ram lambs during the winter months, and has extended to the even more injurious custom of housing and forcing the sucking lambs in the summer with cabbages and grain. Everyone concerned knows this will end in disaster, and that it is rapidly ruining the hardiest mountain breed of Scotland; but it will probably go on increasing till one of the great snow-storms which are recorded in the history of this country as occurring on an average once in two generations (every sixty years) comes to teach the wholesome lesson necessary to save the breed from destruction. A ram which has been forced in feeding while young, not only begets softer offspring, but he is always more difficult to keep in condition on grass in summer and harder to winter. Another disadvantage of forced feeding is that it produces coarse and unshapely animals out of what are naturally the best sheep, and buyers are induced to select rams which have developed from small or badly-nursed lambs, and which do not readily show in their external form the injurious influence of having been forced. This is largely accountable for the recent decrease in the size of the breed.

M'Kersie, Glenbuck, and Foyers, Knowehead, Campsie, were the two most **prominent ram breeders** of the third quarter of last century.

With the low price of wool which ruled for nearly twenty years towards the end of the century, and the **preference for young mutton and for beef**, the keeping of Blackface wethers became unremunerative, and this of course encouraged the natural tendency to throw the higher and more exposed hill ranges into deer forests.

In country towns in Scotland at the beginning of the last quarter of the nineteenth century, more than double the **amount of mutton was consumed as of beef**. The beef supply was confined to the early part of the working days of the week, and nothing but mutton or lamb could be got towards the end of it. Beef was usually a year (or it might be two or three years) older, more mature, and consequently better flavoured, at least when produced from slow-maturity cattle like the West Highland, Ayrshire, or Galloway; but it had to hang for at least six to eight days to mellow before cooking, and it could not be eaten as young meat now is, cut up immediately after cooling. In similar places the position is now reversed: twice as much beef as mutton is wanted, and it is to be had at any period of the week. Boiling in the old days was a much more frequent, as it is a more economical, method of cooking, than the present practice of roasting, stewing, grilling, or brandering.

Market changes have brought corresponding changes in management where sheep are still retained. The demand for mature mutton having decreased, ewes are now largely taking the place of wethers where altitude admits. Top wether lambs bring an enhanced price for fattening, and are in a few cases sold and the seconds kept for wethers. These being generally young lambs, grow, on good farms, with a little extra expenditure on wintering, into as good sheep at three years as the tops, and as they are in lower condition as lambs the death-rate from braxy is not so heavy during the first year. In some cases these second lambs kept till four years old, go to the butcher fat from the mountain pasture, from August onwards, having lost practically nothing by death in the last two years, and having meanwhile yielded 6½ lb. to 7 lb. of wool during each of the two years. The top lambs are kept—on all but the best land liable to braxy—as they grow into the best wethers, especially those of the fleshy, light-wooled types that are not so liable as rough woolly-legged sheep to collect manure and soil.

The best top Blackface wether lambs, put direct from their mothers for ten or twelve weeks on to clover followed by rape sown with a little rye-grass, should increase rapidly in value, and weigh, dressed, generally for the London market, up to 32 or 33 lb. So superior is rape for the purpose, that, if put on turnips or any other green food, even supplemented with cake, they do not improve for a time. To prevent soiling, which is fatal to success, lambs should not run too thick on the ground, and when clover is rank a lie-back or bare field adjoining to turn them out at night is advantageous. So is a dry knoll or other rising ground in the field, to allow the feet to dry and prevent lameness. Hoggs wintering at a distance in the low country from 10th October till 4th April cost (pre-war) 6s. 6d. to 8s. each, and one to the score, or 5 per cent., is an ordinary death-rate during that period.

N. MacMillan, the Knowe, Kirkconnel, Dumfriesshire, has fed Blackface wether lambs with experience similar to the foregoing, but also as follows:—Highland-bred lambs make good feeders—bought (pre-war) at 11s. and sold weighing 27 lb. at 20s. on 10th November. The best sorts of Blackface wether lambs to be finished in December or early in January on good sound turnips in a healthy locality, without the dressings of nitrate of soda, are put, at weaning, in lots of 280 to 300 on to foggage not too rank, but clean and fresh, and frequently changed, so that they may improve every day. In the first week of October they go on to half an acre of soft, growing, but ripe turnips adjoining an acre or two of bare ground from which the roots have been removed to make room for the feeding troughs. Dry food, 2 oz. to each, is begun at once and fed once a day. The amount is very gradually increased to 4 oz. and during the last month to 6 oz., but never more, and is latterly fed at twice. The best results are got from a mixture such as equal parts of dried grains, sound maize (crushed), undecorticated cotton-cake, and oats, with a half amount of locust beans. Chaffed hay is desirable and fresh hay in a rack essential. Turnip cutting begins when the first break of standing turnips is about two-thirds eaten, so that no check in the supply of food occurs. Yellows follow soft turnips. On swedes, Blackface lambs lose their bellies, get less bulky, and do not thrive so well. From 1st November a little salt is sprinkled on each trough of cut roots, and, during frosty weather, also over the empty troughs at night to prevent freezing and to help to keep them scrupulously clean. Sheep do not thrive on unclean food. Under this treatment the best Blackface wether lambs should weigh, by about 20th December, 34 to 36 lb. Smaller lambs take a little longer, but all should go off by the middle of

January, as they are not economical for hogging. Cheviot wether lambs can be fed under the same system as Blackfaces, and they stand spring feeding after Blackfaces are unsuitable. They are ideal turnip sheep and if well treated they respond equally well, and their skins are worth twice the value of Blackface skins. To avoid a sudden change of food and consequent loss of condition, a run on to a few growing turnips while on foggage is an excellent preliminary training.

Blackface cast ewes fed on turnips for from twelve to fourteen weeks, and **wethers** from the hills at three-years-off, weigh, killed and dressed, 60 to 70 lb.; wethers finished on turnips a year younger, get up to about the same weights, but the public taste is not now in favour of mature wether mutton, and few are kept.

The produce of a Blackface ewe by a Leicester ram is called a "cross," "grey-face," or "mule"; that by a Cheviot ram a "half-long." The latter name is given because a Blackface was at one time termed the "short" sheep, and a Cheviot the "long" sheep. As ewes, these sheep of mixed breed are good milkers when kept under favourable conditions, but they are not so hardy on mountain land as Blackfaces. A Blackface ewe carries a lamb by a Leicester three or four days longer than she naturally does one got by a pure Blackface ram. Cross lambs pay much the same as Blackfaces when forced, but they cost more and eat more. The Border Leicester-Cheviot cross suits better for early fattening. Cheviot wether lambs are slow feeders, and generally require to be kept on till spring, when they become the most valuable light-weight Scotch sheep in the fat market. They are unsuitable for finishing on rape in autumn. The feeding qualities of half-longs resemble those of pure Cheviots more than Blackfaces.

Milk-sickness in lambs occurs in upland districts where "draw-moss"—sheathing cotton sedge (*Eriophorum vaginatum*), or spret (*Juncus articulatus*), are in abundance. The malady appears in May, soon after the lambing begins, and continues with greater or less severity till the end of the month, being most deadly in good growing seasons. At times as many as one-third of the lambs born on one day will die. In June, however plentiful grass may be, the evil influences which are liable to be exerted when the sheep are feeding freely on draw-moss or spret do not occur, and late lambs rarely suffer. The disease appears in the case of lambs of about two or three days old, in the form of inflammation of the stomach, and they die in convulsions within a few hours. The *post-mortem* appearances are different from those present when lambs "burst" after taking too much milk, as they are liable to do on rich low-country pasture. A good *precaution-*

ary measure against milk-sickness is to give each lamb one teaspoonful of whisky with a teaspoonful of water twice daily for three days, the ewes which have not lambed being "shed in," so that the work of treating every lamb under three days old may be made possible. A teaspoonful of castor-oil is also effective if given before the lamb sucks. There is not much chance of treatment being successful after the symptoms appear, and no hope of natural recovery. Another means of prevention is to turn out the rams a week earlier than usual, so that a large number of lambs may be dropped before the advent of the most dangerous season. Cases have recently been reported in other districts of a somewhat similar affection, which may not appear till the lamb is twelve days old and which does not respond to the treatment.

The Shepherds' Calendar in the Southern Highlands of Scotland.

January 1st.—The rams come in from the ewes on the hills, and, to restore their lost condition, usually go to winter on turnips in the low country, at the cost of about 6d. per week, or, if wintered at home, receive a daily allowance of 1 lb. of Indian corn, or its equivalent in some other concentrated food, in addition to hay.

February.—Bring in weak ewes to low pasture and give about ½ lb. of concentrated food per day till after lambing time.

March.—Continue to bring in thin sheep to feed.

April.—Bring home ewe hoggs that have been wintered away.

April 15th to 18th.—Lambing generally begins, but on high and exposed places it may with advantage be a week later; and on favoured spots where spring food comes early, a week earlier.

May.—Mark Cheviot and cross-bred lambs during the last week.

June 20th.—Clip Cheviot and Blackface eild sheep and mark Blackface lambs.

July 7th.—Clip milch ewes during the second week.

July (towards the end of).—Dip against maggot, using a preparation of arsenic and sulphur like those of Cooper and Bigg, fortified by an addition of sperm oil, the ewes and lambs together—August being the worst fly month. Great attention is necessary to see that the lambs find their mothers again, else they will be prematurely weaned and thrive badly.

August 1st.—Start drawing four-year-old wethers to go to the butcher, fat from the hill, during the next three months.

August.—Lamb sales in full swing. Wean all hill lambs at dates to suit markets and other conditions. This permits of the ewes making up their condition in that excellent recruiting month.

September.—Ram auctions are on, and draft-ewe sales begin.

September (3rd week).—Dose hoggs with pigs' dung to prevent braxy, where this disease exists (p. 744).

September (end) or October (beginning).—Draft ewes go away —a little earlier than formerly, to suit the English trade, for which they are wanted to lamb early next year. Commence winter dipping.

October (mostly in the *1st and 2nd weeks*).—Winter dipping to be done in dry weather and in the middle of the day, to avert the evil consequences of frost following at night before the sheep get dry at the skin.

November 1st.—Keel, or ruddle, stock sheep with the mark of the farm, and send off the hoggs (recently dipped) to winter on grass. Some are got off a little earlier if possible. In stormy weather the keeling is delayed till after the hoggs are away.

November 17th to *24th.*—The rams go out to the ewes on the hills, and must be daily seen to be attending to their work. To clip the tails and in some cases the insides of the thighs of Blackface ewes before they go to the ram greatly reduces the number of tup-eild sheep—as much as 75 per cent. on some farms. The work is done by a shepherd with four cuts of the shears while the sheep stands between his legs—a cut on each side of the tail and one on each thigh. Long-wool rams that have been well fed and tenderly reared should be fed by the shepherd with 1 lb. or so of oats as he goes his round, to prevent them losing condition too rapidly.

December.—Disturb sheep as little as possible, but watch carefully that the rams are doing their duty.

HABITS OF MOUNTAIN SHEEP, SHEPHERDING, NATURAL FOOD AND SHELTER.

The daily **duty of the hill shepherd** is to see that the sheep travel freely over the ground to which they belong, to get a variety of food, as, if allowed to become lazy, which they are liable to do especially before shearing time, some of them tend to lie on the sweetest patches and make the grass foul, while they thrive badly themselves. Mountain sheep naturally lie at night on the heights, unless they be driven in by bad weather; and good shepherding encourages the sheep to follow their healthy instincts. In winter, between October and March, they get up during the long nights to feed and change their quarters. If the night be fine, they spread out and may go further up the hill, but, if snow or storm threatens, they turn down to natural or artificial shelter, and their second lair may be a long way from the first.

Mountain sheep naturally **incline to pasture** on the restricted area or "heft"[1] on which they have been born, so this limited number of sheep naturally run together and form a "heft." Two, or usually more, hefts compose a "hirsel," or herding, numbering 500 or 600 breeding ewes and 120 to 150 hoggs under the care of one shepherd, aided by a boy in summer. Sheep belonging to the different hefts meet on their unfenced marches, but do not as a rule mingle to any great extent. A shrill whistle given by the shepherd on his fingers is sufficient to separate them and cause them to retreat to their own ground. Sheep on heathery ground encroach to some extent during summer upon adjoining grassy land; and in winter sheep on grassy land encroach on adjoining heathery ground—in both instances drawn by the abundance and change of seasonable food and the scarcity or unseasonable character of their own supply. In winter weather, too, sheep from the dead side of a hill seek the sunny side, especially when snow covers the surface too deeply for them to "work," *i.e.*, scrape with the fore feet to get at the grass underneath.

As the practices of shepherding vary in different districts, no absolute rules can be laid down, but the **general movement of hill sheep** is as follows:—From the beginning of lambing in April till weaning in August (a period when sheep rest but once during the night), the shepherd goes round the heights in the early morning to see that all his sheep move down to the generally richer land. Little difficulty is experienced with the morning start, and the rapidity of the descent may be encouraged by placing rock salt at the lowest part of the ground. Sheep are very fond of licking salt, and they thrive better in consequence, owing to its strengthening and purifying influence on the blood, and the check which it gives to the development of liver-fluke and other worm parasites. During warm weather in spring, it is sometimes very heavy work in the afternoon for both man and dogs to get weak ewes with young lambs out to the hill tops. The shepherd sees all his ground once, and most of his flock twice daily, if he be up, as an anxious shepherd usually is, before the sheep move in the early morning. Those that specially need attention are those that tend to lag behind when he is late. From August till 22nd November, when the rams go out, sheep should be kept to the higher parts of the land, so that the exposed places may be utilised as much as possible before the storms of winter set in, and meanwhile the low pasture is allowed to rest, and clean, and accumulate winter food, where the stock will be much confined by succeeding storms. During a stormy autumn it is a test of the shepherd's skill to determine to what extent it is necessary to let his sheep come down, to prevent their losing condition and becoming difficult to winter. With the least indication of snow, sheep are brought to an "innerly" shelter during the night, and to a place of safety to feed by day. The **best shelters** from cold winds are those formed naturally by the inequalities of the surface of the ground, as rocky knolls, ravines, and other hollows. Natural shelters may sometimes be improved by a few yards of stone dyke (5 ft. high) connecting prominent boulders, or projecting from a boundary fence, on exposed hills. The best shelter from snow, the chief danger, is a small plantation surrounded by a dry-stone dyke. The double fence stops the snowdrift and prevents the formation of deep wreaths, which settle in the lee of a stone wall and cover the sheep which naturally go there for shelter. Sheep have not the instinct or sense to avoid a sheltered hollow where snow is sure to collect and cover them. Circular "stells" made of dry-stone walls are generally available, the size being regulated by the number of sheep in the heft. A "round," 30 ft. in diameter, will accommodate 160 sheep. The circular form rarely permits of the settlement of snow inside, for, during a snowdrift the whirl of wind that generally prevails within, raises and carries it over the wall. In the case of a heavy fall of snow without wind, the sheep moving round keep the snow underfoot.

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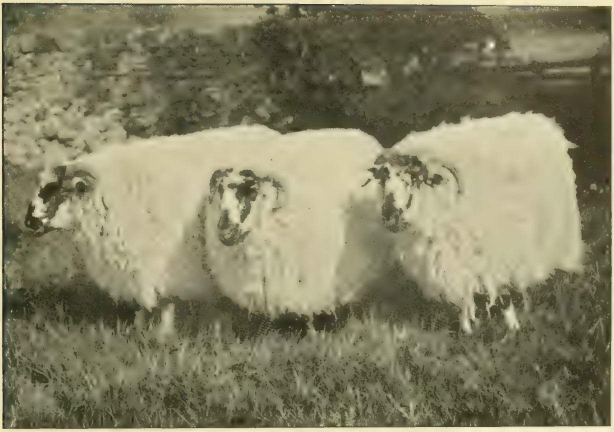
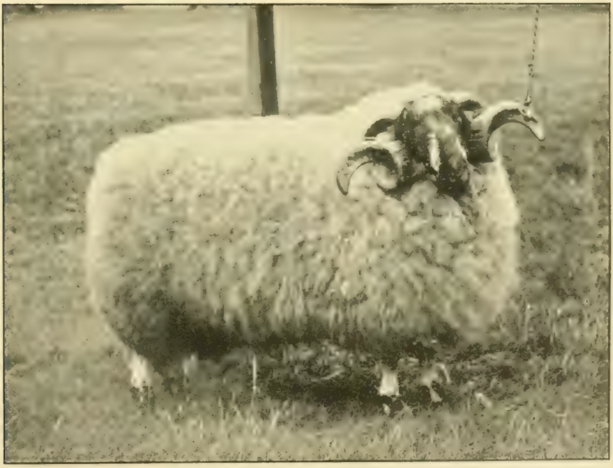
[1] "Heft" is correctly applied to the sheep but also wrongly in some districts to the area they graze on.

Snow stells should be located on dry ground on the lower parts of the hirsel areas, one on each, where sheep naturally resort in winter. No hollow in which deep snow might lodge should intervene between a stell and a feeding ground so exposed that the snow is likely to be sufficiently blown to permit the sheep to work as soon as the wind goes down. When sheep get caught in a place surrounded by snow-wreaths, a passage for them to travel in has to be made by treading. A circle is made a better shelter for all weathers when 6 or 8 yards of wall project outwards on at least two opposite sides. Such wings also act as "wears" or guides to the sheep when entering the "lunky" or hole in the wall, large enough to admit one at a time. Although it is left open, sheep rarely enter a round except during a snow-storm.

"**Black weather**" **stells** of various forms are needed at other periods of the year for the protection of the flocks during rough weather, and should be erected on the more elevated parts of the farm. For newly-shorn sheep and lambing ewes, artificial "bields" (shelters) are specially required. Near the brow of a hill, or where the sheep find resting-places and some degree of natural shelter, is generally the proper position in which to erect wind-breaks. A small round with two or three projecting wings is as good a shape as any for shelter; and as an enclosure

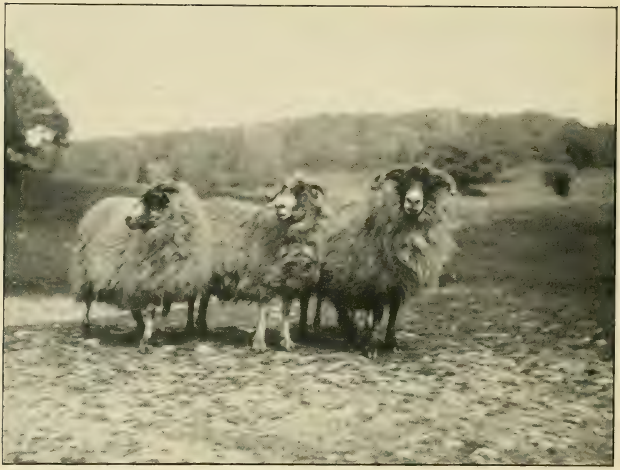


A. LONK EWES.
Bred by J. Hague, Spread Eagle, Whalley.

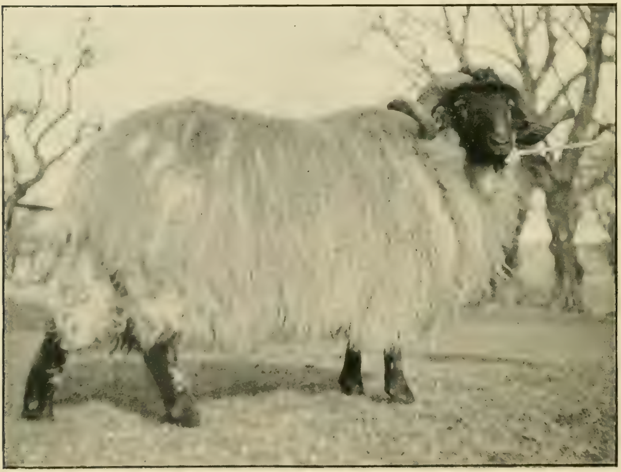


B. LONK RAM, "DEERPLAY BOY."
Winner of five first prizes, including the Royal Lancashire Show Cup in 1904.

[G. H. Parsons, Alsager, Cheshire.



A. Rough Blackface Horned Cast Ewes of the Lancashire Hills.
After breeding fat lambs by a Long-wool ram.

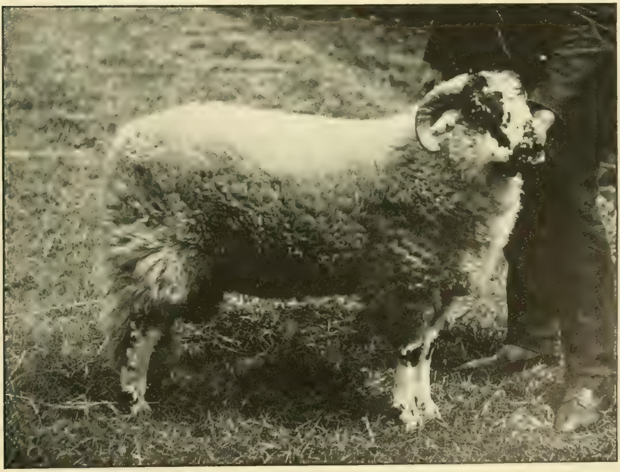


B. Rough Blackface Horned Shearling Ram.
Bred near Coniston, Lancashire.

[Sydney Pennington, M.R.C.V.S.

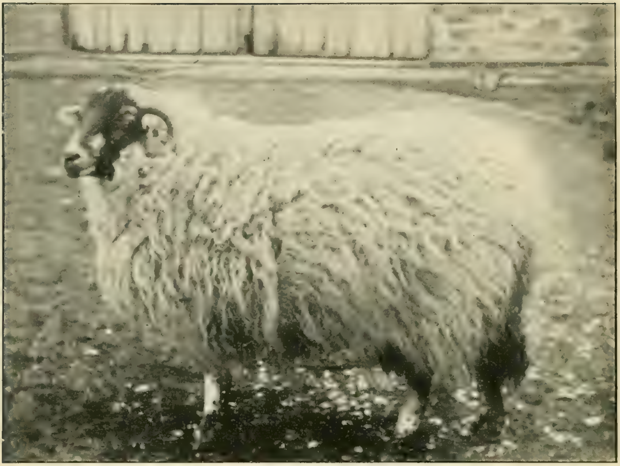
PLATE CLXVII.

A. Lonk Sheep, on Langsepp Moors.
On the coal formation where Yorkshire, Lancashire, and Derbyshire join.

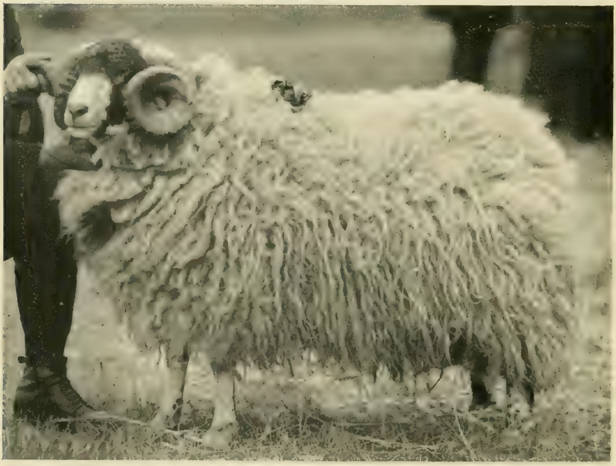


B. Lonk Lamb Ram, "Worstorne Wonder."
Bred by J. Hague, Spread Eagle, Whalley.

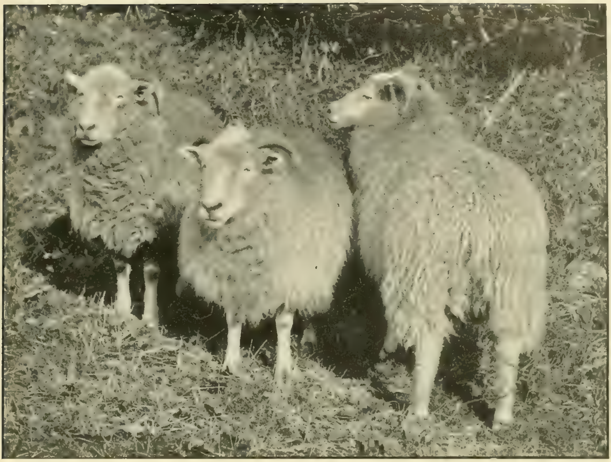
[*G. H. Parsons, Alsager, Cheshire.*



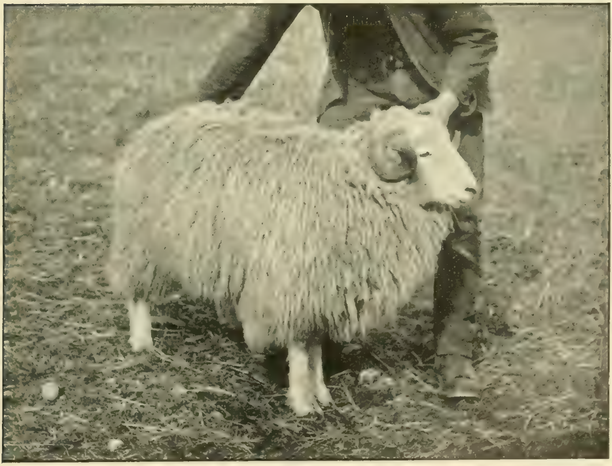
A. Swaledale Ewe.
Bred by John Wm. Hastwell, Howgill Foot, Winton, Kirkby Stephen.
[*E. Yeoman, Barnard Castle.*



B. Swaledale Dales Bred Ram.
First at Derby Royal. Owned by T. W. Guy.
[*"Agricultural Gazette Photograph."*

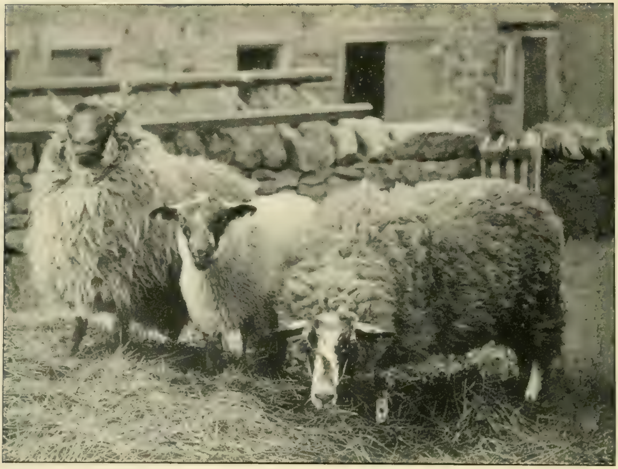


A. LIMESTONE EWES.

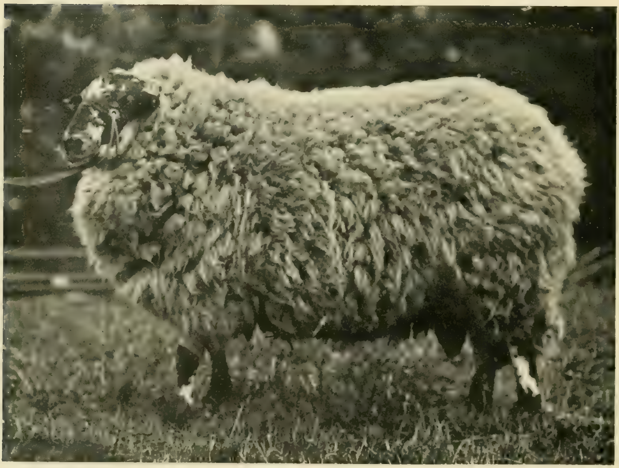


B. LIMESTONE RAM at a year old.
All bred by T. A. Corunthwaite, Crawthorpe Hall, Burton, Westmorland.

[*C. Rowbotham, Burton.*

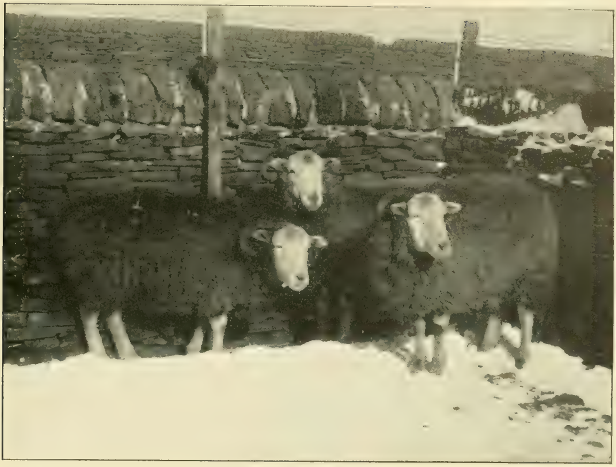


A. Derbyshire Gritstone Ewes and a Lamb.
Bred by Wm. J. Clark, Alport, Bakewell.

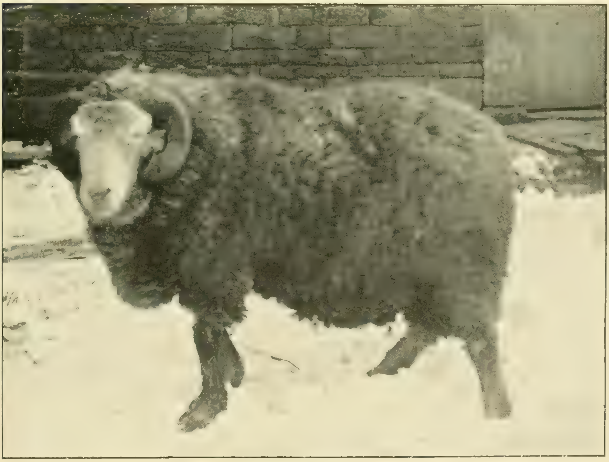


B. Derbyshire Gritstone Ram.
First at Darlington Royal. Owned by Sir J. O. S. Thursby, Bart.

"Agricultural Gazette Photograph."

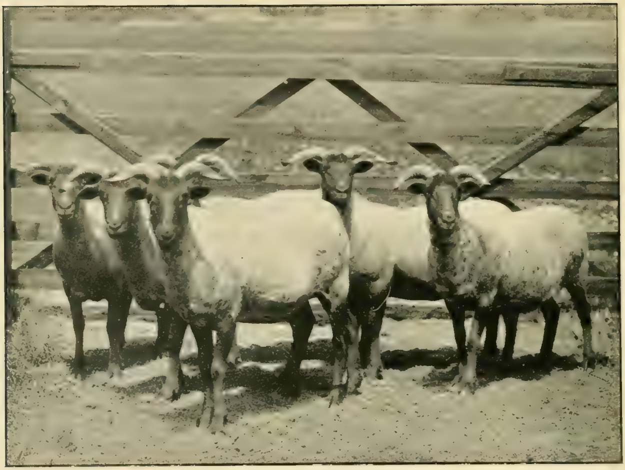


A. PENISTONE EWES.

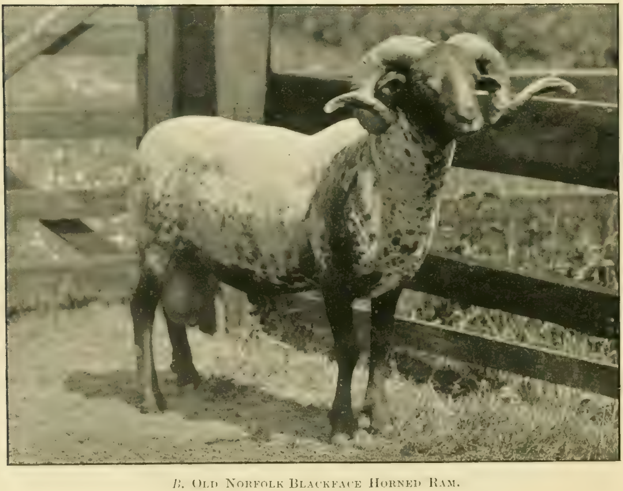


B. PENISTONE RAM.
The property of J. Turner, Boardhill, near Penistone.

[*Biltcliffe Bros., Penistone.*



A. Old Norfolk Blackface Horned Ewes.



B. Old Norfolk Blackface Horned Ram.
The property of Garrett Taylor, Trowse House, Norwich.

to accommodate a ewe needing special attention, it is also a great convenience in the lambing season. Other stells may consist of a few roods of stone dyke in the form of a crescent; or like the three legs seen on a Manx coin, diverging from a common centre; or a capital T turned with the top downhill.

The natural food of Scotch hill sheep (footnote, page 596), derived from a great variety of plants, differs materially from the food produced by lowland pastures, many of which have been artificially sown. The best hill plants, owing to their hardiness and ability to exist on mountain and moor where more delicate kinds would die, are classed as weeds when they appear in lowland or improved pasture. These plants are not as a rule so intimately blended as the varied herbage of lowland pastures, but small or large areas are often occupied by single species or varieties. It is therefore most important to herd sheep so that each "hirsel" gets a balanced share of the various kinds of plants on the hill or moorland area available. The amount of stock a given place will carry, and the size and quality of the sheep, depend upon the minimum supply of natural food at a given season. Sheep that might be good cannot be so classed if they are starved at one period of the year. Under skilled management sheep pastures are vastly improved, simultaneously with the sheep, by surface- or sheep-draining water-logged areas, to reduce and refine the excessive growth of damp-land plants and enable the sheep to travel over the surface at all seasons. **Moor burning** in rotation, usually in dry weather in spring before the 25th of April[1] is the best if not, with rare exceptions, the only way to clear off excessive roughness of heather and bent-grasses. This extremely important and highly technical practice is fully discussed by the Author in *Heather and Moor Burning for Grouse and Sheep* (Oliver and Boyd, 1917). Excessive roughness can also be successfully kept in check by grazing a moderate number of cattle with the sheep, except where their presence increases the death-rate of sheep from braxy. The cattle also by trampling the bracken help to minimise its increasing tendency to spread, and this all the more effectively if it is cut at the height of the growing season, when the sap is in full flow so that it bleeds, and prevents the collection of a store of plant food in the underground rhizomes for the next year's growth. Cutting a limited amount of grass, spret, and sedges to make hay for the sheep in times of snow-storms or prolonged black frosts, clears the ground and provides useful aftermath for sheep in autumn. The application of basic slag, 10 cwts. to the acre, on grassy land good enough already to respond to it, tends materially to improve the quality of a flock, both ewes and their lambs, if care be taken to cover a sufficient area, in positions that will not upset the natural run of the hirsel or flock-unit. Improvement by the sowing of seeds is in this case out of the question.

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[1] "Game and Heather Burning (Scotland) Committee Report, 1921" (Cmd.), H.M. Stationery Office, price 6d.

The areas under discussion are roughly divided into (*a*) "Black land" or heather land for the most part, the natural habitat of the Highland or Blackface, and (*b*) "Green land" where spret and grasses predominate, and where Cheviot sheep are as a rule the more suitable stock.

Common heather (botanically "ling," *Calluna vulgaris*), an evergreen, somewhat shrub-like plant which covers the greatest extent of surface, comes first in respect of its utility. It is the chief food of grouse and of sheep on Black-land areas. The interests of grouse and sheep are identical in demanding that, by systematic burning in strips, it shall be kept in full vigour of growth so that when burnt at the proper time it will grow up the same season, throwing out buds, followed by shoots from the truncated stem of the original plant. If left till it is too old before burning, say over ten or twelve years on hard dry land, or if burnt out of season, the old plants are killed and the new growth springs entirely from the abundant deposit of seed below the old heather, which may lie dormant for a period of years (three or four up to twenty) until the accumulated remains of the debris of heather rot and consolidate into soil. **Cross-leaved heath**, "she" heather (*Erica tetralix*), with thin slender stalks, grows much more freely after common heather has been burnt when too old; but neither this nor **bell-heather** (*Erica cinerea*) is of utility for sheep, which do not freely eat their terminal shoots, leaves, and flowers as they do those of common heather. **Stool bent** (*Juncus squarrosus*), an evergreen rush, is a valuable winter and spring plant found growing extensively on black-topped, moderately moist moss land. Its succulent leaves are greedily eaten by sheep down to the crown of the plant in "hard" or frosty weather when the surface is clear of snow. When summer grasses come it is no longer eaten. **Spret** (*Juncus articulatus*), a round, hollow-leaved rush with here and there false joints, is the most valuable plant on damp hill land other than pure or living moss. It is not evergreen, although its young darning-needle-like shoots may be found throughout the winter in very mild seasons. Sheep find and pull these "pods," as they are called, with avidity, and thrive well when they are abundant. On many green hill pastures stocked with Cheviot sheep, their belated growth is sure to be followed by a bad lambing season. Surface draining is the best general method of encouraging good grasses, fescues and poas, checking their excessive luxuriance, which usually causes large areas to lie down and become worthless for the remainder of the season.

Of the valuable *Cyperaceæ*, which include sedges, **draw-moss** (*Eriophorum vaginatum*) is the most valuable on farms where it exists at an elevation not too high and exposed to be reached by sheep in stormy weather. It grows best and comes earliest on very wet mossy land. As early as January in very mild seasons handfuls of rounded white succulent leaves up to 6 or 8 in. long may be pulled from the uniformly-shaded, brown tufts which indicate its presence, and are easily distinguished from the mottled-brown appearance of withered deer-hair leaves. If, as in a cold or backward season, the "moss-crops," or single terminal flowers on spikelets, do not appear, and the tufts do not draw before the end of March, the sheep will be deprived of their best milk-making food and lambs will thrive badly. Draw-moss land is easily injured by over-draining and by too frequent burning in spring. **Carices** or common sedges are of value but not of much importance, because, although represented by numerous species, they occupy but a small proportion of the surface area and are deficient in ash constituents. The two most important are the tufted and carnation carices (*C. cæspitosa* and *C. panicia*), which may be seen growing in damp places throughout mild winters. Sheep eat the green leaves when they can get at them. The "pry-hay" of some districts, which is useful fodder, is made from carices. **Common nard**, mat-grass, or wire-grass (*Nardus stricta*), which grows best on hard dry land, is hardier than any other grass and comes earlier in spring—usually in March in the Highlands. It keeps growing after it appears, even in backward weather. At lower elevations in mild seasons it may be seen to send up green needle-like shoots all winter. Sheep eat it in the young state, but leave it when better and softer grasses come. The worthless white tufts left should be burnt early in spring. **Deer hair** (*Scirpus cæspitosus*) comes into usefulness a little later than wire-grass, but at times varies much with the season in the "Highlands," from the beginning of April till even into May. It grows best on mossy and damp soils and is the substitute for draw-moss when that is absent. Sheep there are never safe for spring food until it is fully come. When good grass springs early, they leave it by June or even before. The terminal flowers, which begin to form soon after the plant appears, harden and make it distasteful to sheep, sooner than to cattle. Like nard, it benefits by frequent burning. **Sweet vernal** grass (*Anthoxanthum odoratum*) is next to come after mat-grass, sending up, about the end of April, light-coloured green leaves through the old withered tufts, over every description of hill land. The leaves are more valued because they come early than for their quality. **Blow-grass** (blae-grass) or purple molinia (*Molinia cærulea*), springs a little later than vernal grass, for which it is at first easily mistaken. It is not so generally distributed, but confined to particular kinds of black-topped or mossy land. It is called "flying-bent," owing to the thin, light, withered leaves breaking off at the base in autumn and being blown before the wind, to settle against fences and in open drains or other hollow places. To keep it in good order the land should be burnt every second year. After burning, the young leaves, two rolled together, spring like a braird of oats. At an early stage the leaves draw like draw-moss, and present tender, succulent white leaves, greedily sought for by both sheep and cattle. Molinia makes light, "boneless" hay, rather deficient in mineral matter, but useful if got without rain and if eaten during the succeeding winter. **Tufted aira** (*Aira cæspitosa*) is a very hardy, coarse, rough-leaved, dark green grass, growing in tufts. Sheep find the green leaves in the withered bunches of special value in a snow-storm in the dead of winter, as the tufts stand up in the snow, being usually found at lower elevations in good, green hollows not too dry. It makes good hay if cut early, but the leaves become hard and rough, and both cattle and sheep leave it as the season advances. It is an obnoxious weed on fine old pastures like those of Lincoln or Market Harborough. Many of the hardier natural grasses and weedy plants seen in lowland pastures unite with the plants already mentioned to form a covering for the ground, but later in the season. Among these are the fescues, the poas, and crested dog's tail. Two grasses usually classed as weeds in good pasture, **Yorkshire fog** (*Holcus lanatus*) and **creeping bent-grass** (*Agrostis stolonifera*), are of special usefulness on hill pastures. Although this agrostis may be poor on poor land, it makes a valuable ingredient in pasture that is being improved, with dressings, for example, of slag phosphate, or of steamed bone flour, where that is thought to be preferable. After **wild white clover** (*Trifolium repens*) and the **wild red clover** (*Trifolium pratense*) have been thus encouraged to expand, the bent-grass, which persists on all soils to which it is indigenous, whatever the treatment may be, improves in quality and is eaten down freely. **Yarrow** (*Achillea millefolium*) on dry land, and **bog asphodel** (*Narthecium ossifragum*) on mossy, damp land, are two common weedy plants that serve as relishes as well as food for sheep.

CHAPTER XXVIII

SHEEP—MOUNTAIN AND MOORLAND BREEDS (*continued*)

The Lonk—The "Rough" Sheep—The Swaledale—The Gritstone—The Limestone—The Penistone—The Old Norfolk Horned Sheep—The Herdwick—The Welsh Mountain—The Kerry Hill—The Radnor or Tanface—The Clun Forest—The Exmoor—The Dartmoor.

The Lonk sheep is a native of North Lancashire, the West Riding of Yorkshire, and some of the Derbyshire moorlands, which grow strong, coarse, tufty herbage called "lonk"—famous for grouse. The district round Clitheroe and Skipton is one of its strongholds. It resembles the Scotch Blackface, but is leggier, with a larger, longer body and a bigger head (a longer and narrower face, with a deep jaw and Roman nose), a longer and rougher tail, and in the ewe stronger horns. The horns of the ram coil more quickly and come out a little further back, and their back edges stand up higher than in the Blackface. The wool comes close up to the back of the horn. The black and the white of the face and legs are distinct and clear. Brown is objectionable. The face and legs should be free from wool, except a small tuft on the forehead and a little fringe on each hind leg. In constitution the Lonk is not so hardy as the Scotch sheep, but it has a much closer, finer, and probably a little heavier fleece, which weighs 4½ to 5 lb. in the case of ewes kept in moderate condition, up to 6 or 7 lb. for ewe and hogg on the best pastures.

The rams have been used to cross with Scotch ewes to increase the size and improve the wool, but the attempt has not succeeded, as the constitution of the produce is weakened. The sheep are mostly kept in small flocks of not more than 200. Sometimes they are all sent off to winter in the lowlands in Cheshire and Derbyshire from wet country, unfavourable for sheep in winter. The ewes return about the beginning of March, and hoggs in the end of April or beginning of May. Some farmers do not send their sheep away, but supply them with hay and a few oats. Ewes begin to lamb about the middle of March; the earlier, the fewer the deaths of lambs. Wether lambs fit for the butcher go off in August and September, and the rest run over to the following autumn, and kill as exceptionally lean mutton up to 70 and 100 lb.; they handle hard on the back, and the back-bone stands up.

Lean mutton is in special request among the cotton spinners of Manchester, and the founders in the Black Country, who have a strong aversion to fat.

The Lonk Sheep Breeders' Association and Flock Book Society issued the first volume of *The Lonk Sheep Flock Book* for 1905. From this *brochure* of 18 pages we learn that the breed is old and "well adapted to a mountainous district which does not seem to be favourable to any other breed"; also, that it is the duty of the Association to encourage its increase in quality and quantity.

The "Rough" sheep, also called "Kendal Roughs," and "Rough Fell sheep," are the Blackface mountain (horned) breed of the North of England. They differ conspicuously from Lonks, being smaller and in their wool stronger and coarser. The black of the face is not so clear, being often of a brown tinge. Although it has been in existence for hundreds of years on the Westmorland Fells and part of the Yorkshire hills, little seems to have been written about it, and consequently it is not well known outside its particular area, which includes Grayrigg, Whinfell, Bannisdale, Longsleddale, Kentmere, Borrowdale, Birbeck, Tebay, Howgill, Middleton, Crosby, and Breatherdale Fells. It is practically identical with the Blackface sheep which existed in the Highlands of Scotland into the latter half of last century, but its wool is not so long and strong as that of the modern Scotch variety. It is a true mountain, slow-maturity type, hardier than any of the other allied breeds of the North of England, bigger and hardier than, and preferable to, the Dale breeds on the most exposed places, like Ravenstone Dale and the higher western hill ranges of Lancashire, Cumberland, and Westmorland, such as Orton and Shapfell—through the latter of which the London and North-Western Railway from Carlisle to London passes. It is as incapable of improvement beyond what the local circumstances of soil and climate will permit as other mountain breeds. Some varieties on poor land are small and not of much account to look at; but the better types are big sheep, and the ewes, being good milkers when brought into lowland pasture, produce good cross-bred lambs.

As hill sheep they are mostly bred pure, but it is possible that there may have been a cross occasionally with a Scotch or Swaledale ram in order to improve the quality. Rams are usually turned to ewes during the first fortnight in November, lambing commencing the last days of March and continuing well into May in the higher hills. There one lamb per ewe, at the close of the season, is considered satisfactory, while the lower lying farms may average 1¼ or 1½ lambs per ewe. The lambs are weaned when about four months old, and are sold at from four to eight months old. Unless the weather is very severe with heavy snowfalls, the sheep are not brought to the lower land in winter. If required, good meadow-hay is given to them.

Characteristics.—Though resembling the Blackface, they are bigger, more bony. *Head*—Black, and black-and-white face, with strong, wide-set horns. *Neck*—12 to 15 in. in length. *Body*—Broad set and deep, standing on good legs, with a little fringe of wool on the hind legs. *Wool*—Average weight per fleece 5 to 6 lb.; price per pound (1913), 9d. *Mutton*—Excellent.

Economic Position.—Though somewhat slow to mature, this breed is hardy and particularly suited to the districts named. Excellent classes are found at the local shows:—Kendal, Grayrigg, Shap, and Kirkby Lonsdale. The largest breeders are Richard Bownass, Middleton Hall, Kirkby Lonsdale; Edward Wood, Grayrigg Hall, Kendal; and Joseph Wood, Bannister Head, Kendal.

The Swaledales or **Swaddles** are one of the best-known remaining representatives of a number of varieties of Yorkshire horned breeds which were classed as Dale sheep, and were originally formed to suit their local surroundings by commingling, in varying proportions in different districts, the blood of the hardy mountain sheep and that of the old Teesdale Long-wool, which is represented by the modern Wensleydale. They are very similar to, if not identical with, the Neasham sheep—named from this central market town, which holds large annual sheep fairs in September. The type extends westward to the Pennines and into Westmorland, Sedbergh, Penrith, Kendal, and the surrounding Dales. Garnett says:—"Ravenstonedale is the dividing line between the Swaledale and Rough Fell sheep." It is a good and hardy breed, and much in favour with butchers, having dark grey faces with, generally, mealy noses and mottled shanks. They are proportionally longer than Scotch Blackfaces, and look smaller, although they are big bodied and handle well, but not so well wooled in front. The face is weaker than that of a Scotch Blackface, and the tail is long, like the tail of the Lonk. They grow a shorter stapled wool of finer quality, closer put on, except at the breeches, where it is long and coarse and gives them a badly balanced or light fore-quartered appearance. A good clip averages 5 lb. for ewe and hogg, and sells for about the same price as Scotch Blackface wool, and both are used for the same purpose by carpetmakers. It is not unlike the Lonk wool, but a shade coarser.

Swaledale **ewes** are increasing in numbers and in popularity, as they are good grazers. It is claimed that the draft ewes fatten more readily than the Scotch Blackface, and that they are better milkers and produce better and fatter lambs when crossed with the Wensleydale Long-wool ram. But the lambs are lighter in the face and not so clear in the complexion as the Wensleydale Scotch cross, and the wool is fluffier and not so long and nicely stapled. The ewe lambs of the Scotch cross have a preference in Yorkshire over the Swaledale cross for breeding second crosses, which are fuller of quality about the head and fleece, and not so light in the face as Swaledale crosses are liable to be. Many thousands of ewe hoggs and draft ewes from Scotland are taken to Yorkshire annually—the ewes to cross with the Wensleydale and the hoggs to breed pure Blackfaces, generally for three seasons, and afterwards cross with the Wensleydale. Many of the Blackface and Dale-bred wether lambs are grazed on the Derbyshire moors. The so-called "Scotch bred" flocks are principally found in Wensleydale, Bishopdale, Coverdale, Nidderdale, and the moors above Kettlewell and Buckden. The Scotch Blackface and Swaledale breeds were early in the second decade of this century successfully blended in an experimental way by John Blackly, at Dalwyne Farm, Barr, Ayrshire—ten ewes and a ram being introduced. Crosses both ways were longer in their necks and tails, and leggier than pure Blackfaces, but they were generally heavier sheep. Although the wool was closer and appeared to be finer, an expert woolstapler valued it 1d. per pound less than Blackface wool, owing to the presence of kemps and greys. The fleeces of the ewes weighed only 4 lb. against 5 lb. given by the Scotch Blackfaces on the same ground. The resulting presumption is that on bare, hard grass land in the southern Highlands of Scotland, Swale ewes and their Blackface crosses would nearly hold their own with pure Blackfaces, although their long neck and legs would be against their finding purchasers, especially in a bad market; but on deep land, growing spret (*Juncus articulatus*), or heather (*Calluna vulgaris*), and draw-moss (*Eriophorum vaginatum*), the Scotch sheep is decidedly the more suitable.

Swaledale **rams** are sought after to breed with the commoner sheep more nearly allied to the Blackface mountain type, to improve both bone and quality. The overfeeding of rams has been known to ruin a good hardy flock. Stock rams pasture on the hills with the ewes in summer. The running stock does not as a rule receive any food in winter but hay, and that sparingly, till the latter part of February and March, except during a snow-storm. From half to the whole of the ewe hoggs are wintered away in the lower parts of Yorkshire. Lambing begins about the middle of April.

The Derbyshire Gritstone sheep were known as the "Dale-o'-Goyt" breed till 15th October 1906, when at a meeting at Bakewell the "Derbyshire Gritstone Sheep Breeders' Society" was formed, and the name adopted as the more appropriate and distinctive title, distinguishing them from the old Limestones, and indicating the geological formation on which they have been bred pure for more than one hundred years in the bleak hills and dales of the Peak of Derbyshire. The breed is extremely hardy, hornless, and dark or mottled on the face and legs. In size and general appearance it resembles the Herdwick more than any other mountain breed, but it is declared on the most reliable authority to be quite distinct. The wool is among the shortest, closest, and finest varieties of mountain wools. It fetched as high as 34s. per tod of 28 lb. in 1905-6, in spite of its being liable to the occurrence of black patches, especially that grown on the belly, thighs, and rump. The ewes are the best of mothers, and the lambs feed quickly, and they produce mutton of the finest flavour, not too fat. Indebtedness is acknowledged to W. J. Clark, Secretary of the Derbyshire Gritstone Sheep Breeders' Society, and of the Farmers' Club, Bakewell, Derbyshire, for much of the foregoing information, and for the photograph original of Plate CLXX. A.

The Limestone or **Warton Crag** or **Silverdale breed** became extinct about the beginning of the second decade of this century after existing for many years as a unique local variety.[1] The home of the breed embraced eight parishes or townships on the dry limestones mostly in the lower districts of Westmorland. A few extended to the Derbyshire hills—the Pennine range.

Points.—Both males and females were horned, and the faces, legs, and long fine wool white. It was a very hardy and active breed possessing a noble carriage, admirably suited to mountain climbing, although it reached its maximum size on dry lowland pasture.

The ewes were good mothers when not interfered with, but, if approached or handled, they might become "petted," and even run away from their lambs. The quality of the mutton was unequalled by that of any other English breed, except the Herdwick and the Welsh mountain sheep. The ewes resembled the ewes of the Dorset Horn, in that they came in season at almost any time of year, and consequently were used for the production of Christmas fat lamb. Its disappearance gives cause for regret, as none of the sheep which have taken its place are so well suited to the district.

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[1] The father and grandfather of R. Parker, Moss End, Burton, Westmorland (who was good enough to supply information for the 4th edition) bred Limestone sheep on the same farm for nearly one hundred years.

W. H. Barber, who is credited with having possessed the four last pure-bred sheep, wrote in October 1921:—"We left Saltcotes Farm last year. I think the Cragg or Limestone sheep are now quite extinct. We sold our last to the butcher about 1914 or 1915. I have never seen or heard tell of one since."

The Limestone sheep appear to have been replaced by a variety of breeds or cross-breeds. For example, one man stated that Wensleydale and Kendal Roughs have been crossed; another says that an improved type of Blackface sheep was being used, closer in the wool, which he thought was due to crossing with Down rams: these sheep are bigger than the Blackface and mature earlier. Edward Whinnerah, Estate Offices, Burton, Westmorland, reports as follows:—"The sheep have not been replaced by any distinct breed or variety, but the Cragg lands are now used for the pasturage of store sheep of various breeds, more particularly in the autumn, when farmers from other low-lying districts send their store sheep on to the limestone allotment immediately the lambs are weaned, for the change, which is said to benefit them very greatly. With reference to the returns from this mode of farming this allotment land, the present system is found to be more remunerative than the past. For several weeks in autumn, the occupiers of allotments are able to command as much per head, per week, as their adjoining neighbours get for the turnips consumed on the land by sheep."

The modern **Penistone breed** is akin to the Limestone breed, with a white or light grey face and well-developed horns. It is found in small numbers in the vicinity of Penistone, the highest market town in England.

According to Low, the Penistone breed owes its preservation to the high and exposed character of the country on the coal formation which it occupies. It is possessed of a very long tail, and it is said on authority to resemble most the Lonk of the various Heath breeds to which it is related.

John N. Dransfield[1] writes as follows:—

"Spooner's *History of Sheep* (1844), says:—'The Penistone is a breed of sheep found on the borders of Yorkshire, Lancashire, and Derbyshire, on a heathy tract of land about twenty-six miles in length by twenty in breadth, and they are called the "Penistone" from the market town of that name, where they are sold. They are described by Mr [Prof.] Low as having wool of a medium length, of a silky appearance, but harsh and wiry, and weighing from 4 lb. to 5 lb. the fleece. They have white faces and legs.

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[1] In *A History of the Parish of Penistone* (printed by J. H. Wood, The Don Press, Penistone, 1906).

The rams exceed the size of the ewes and wethers in an unusual degree, a peculiarity which is ascribed to their being taken to the lower country to be reared. The rams alone[1] have horns, which are very large, lying close to the head and projecting forward. A distinguishing character of this breed is an extreme coarseness of form, and especially of the extremities. The feet are large, the limbs long, the shoulders heavy, the sides flat, but the most singular characteristic is the length and muscularity of the tail, in which respect the Penistone sheep differ from all others in the country. This enlargement of the tail is merely muscular and long, and not analogous to the growth of fat which takes place in the tails of certain sheep of Eastern countries. The mutton of these sheep is highly valued for its juiciness and flavour.'

"Formerly many parties kept flocks of this breed, as the extract below, from the book containing the **Orders of the Shepherds' Society**, held at Saltersbrook, by the principal sheep keepers in the Liberties of Woodlands, Penistone, Bradfield, Longdendale, Saddleworth, Holmfirth, Glossop, and Kinder, and the marks distinguishing their sheep, printed in 1807, will show. *Orders.*—At a meeting held at the house of Thomas Taylor, at Saltersbrook, on the 20th July 1807, the following conditions were agreed on by those who entered into this Society: I. That two meetings be held at the aforesaid place annually, the first on the 20th of July, and the second on the 5th November, except those days happen on a Sunday, then on the day following. II. Any person bringing strayed sheep to the above meeting, the owner or owners of such sheep shall pay or cause to be paid reasonable expenses for taking up, keeping, and bringing them to the said meeting. Lastly, That all finders who have books of marks, if any sheep come into their hands belonging to any member of this Society, they shall take them to their respective owners, who shall pay them reasonably for their trouble."

The meetings are still held annually at Saltersbrook and at the Snake Inn in the Woodlands, and though the gatherings may not rival those of yore, still old tales and reminiscences are told and

"Ale and song and healths and merry ways
Keep up a shadow still of former days."

In the early part of the last century a number of Penistone moorland sheep were sold from Rowlee Farm in the Woodlands and sent into Kent. Three of them did not settle there and started back, and two of them it is recorded actually got back, and the horns of one of them were hung up in Hope Church.

The seal of the Burial Board of the ecclesiastical parish of Penistone is a horned sheep of this breed.

The history of the sheep in this country is coeval with its earliest history, and the first woollen manufactory in the island was established by the Romans at Winchester. Some of the fabrics reached Rome, and they were so highly appreciated that during the continuance of the Roman domination, in the most luxurious era of the Empire, the finest and most expensive robes—those used only in days of festivity and ceremony—were furnished by the British factories. One Roman writer, Dionysius Alexandrinus, uses the following language as quoted by Hollinshed, and strongly expressive of the value of the material: "The wool of Britain is often spun so fine that it is in a manner comparable to the spider's thread." The first Guild of Fullers was chartered at Winchester.

"To spin with art, in ancient times was seen,
Thought not beneath the noble dame or queen;
From that employ our maidens took the name
Of spinsters, which the moderns never claim."
—*British Farmers' Magazine*, 1830, p. 436.

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[1] Not so; both sexes have horns.

The Old Norfolk Horned breed belongs, on the authority of Prof. Low, to "the same general type as the Blackface Heath breed," although, owing to its location on light chalky soils in a dry climate, the "wool, 2½ to 4 lb. the fleece, is fine and 'silky,' and possessed of sufficient felting properties to fit it for being made into second or livery cloth." It proved in competition with imported merino wool to be inferior for this purpose, and the breed has become almost extinct. "They were long the prevailing breed of Norfolk and Suffolk," but in Low's time (1845) the earlier maturity breeds, chiefly the South Down, had driven them out of the better country to the "higher lands of Norfolk, Suffolk, and Cambridgeshire." They were noted, says Low, for "hardiness and robustness, great length of limbs, and flatness and lankiness in the body, and too great wildness of temper. . . . They hold their necks erect, and in their carriage resemble antelopes. . . . No finer lambs are brought to the English markets than the first crosses between them and Leicester or South Down rams." The **last remnants** of the breed lingered in the flocks of Russell Colman, of Crown Pound, Norwich; and the Executors of the late Col. Harry M'Calmont, Newmarket, Cambridge. The last-named flock contained thirty-five ewes, which yielded about 8 lb. of wool each. The wether sheep were kept till three years old, and disposed of to the butchers at Newmarket Christmas market, at very high prices. The flock was dispersed in 1919, and the writer failed to find any survivors in 1921. The Coleman flock "went West" in 1912, being drowned on 26th August, when 7·2 in. of rain fell in twenty-four hours and produced the greatest flood ever known in Norfolk. The sheep had been grazing on marshes, according to custom, with a herd of Highland cattle. When the flood reached them all the animals made for the highest land near the gate. When this was opened the cattle escaped, but the sheep refused to be driven to safety and were left as darkness came on, after repeated attempts, and disappeared before the morning.

The symmetry of the breed had been enormously improved by selection and in-breeding, and before it disappeared it consisted of remarkably handsome animals with jet-black faces and legs, gay, high-set, expanding horns, and black-spotted bodies (Plate CLXXII.). The ewes were very prolific, excellent mothers, and good grazers, but they required a large roam. They never suffered from foot-rot, and so free were they from the common diseases, that old age was the most common cause of death. When ready for the butcher, the Norfolk sheep carried a large proportion of lean, and no breed could show the same proportion of red meat to fat at the end of the saddle cut. The breed gained First Prize in the Carcase

Competition at Smithfield Christmas Show in 1900, and Second in 1901. A wether out of a Norfolk ewe by a South Down ram was First in the Carcase Competition for Crossbreeds in 1912, scaling 102 lb. dead-weight at 21 months old.

Garrett Taylor, Trowse House, Norwich, wrote on 30th June 1906:—"One of the drawbacks to the Norfolk Horned sheep is, they can jump like goats, and are very difficult to keep within bounds, very wild, and very slow meat-producers; but when once fat, the flesh is most excellent and of a very rich flavour"; and little wonder, for, as explained at page 685, it was one of the original parents of the Suffolk breed.

The Herdwick breed is the hardiest of all British mountain sheep. It is found in greatest numbers throughout the English Lake District, the Fells of North Lancashire, Cumberland, and Westmorland. "They are almost the sole stock of the mountains from Skiddaw, Saddleback, Caldbeck, and Helvellyn on the north, to Kirkby Moor or Ulverston on the south, and graze up to 3000 ft." A few flocks have been taken to Wales and other parts, and there is a tendency towards the increase in the total numbers of the breed, although probably not so rapidly since the Swaledale invasion, which was carried on for a time with the object of breeding cross ewes to be again crossed with Leicester or Wensleydale. It is recorded, but receives little credence, that about the time of the **Spanish Armada**, "forty small sheep managed to save themselves from the wreck of a Spanish vessel stranded on the sandy coast of Drigg, and were claimed as flotsam and jetsam by the then lord of the manor." **Youatt's statement** (condensed) is more circumstantial, but quite different, viz., that—

> "In the beginning of the eighteenth century a ship was stranded on the coast of Cumberland, that had on board some Scotch sheep which seem to be now unknown. They were purchased by some farmers at Wasdalehead, Gosforth. They were small and active, and evinced a peculiar sagacity in foreseeing the approach of a snow-storm, for, a little before its coming, they clustered together on the most exposed side of the mountain, where the violence of the wind prevented the snow from lodging. They were continually moving about, and by their ceaseless activity they scraped away the snow, however deeply the herbage might be buried. With such a degree of interest, and almost of superstition, were they regarded, that the owners formed an association to keep them to themselves. Each agreed never to sell a ram and not more than five ewe lambs in one season. Nevertheless the sheep gradually found their way to the adjoining mountains. They were called 'Herdwick' from the feudal grazing custom of farming out a flock—'the heaf (heath) going flock'—to a herdsman, who retained a few of them in lieu of wages (from *herd*, a number of animals, and *wick*, a place or run)."[1]

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[1] The Charter of lands at Furness Abbey, dated 1537, refers to "Pastures and Agistament . . . devyded into sundry herd wycks and shepe cots."

Another account by the **Rev. T. Elwood**[1] says the sheep came from a Norwegian vessel, and that "they were taken possession of by the lord of the manor, and on their increase being found hardy and suitable for the mountains, were let out in 'herds' or flocks with the farms." He supports the theory of the Herdwicks coming with early Norse settlers by references to many Norse words, names of places and country customs still existing in the Fell districts of Cumberland, Westmorland, and North Lancashire, and to the evidences of Norse relations with the coast of Ireland, the Faröe Isles, Orkney, Shetland, and the Hebrides. This view, however, is not supported by the use of Cymric numerals used in scoring by Herdwick men, as if they were Scandinavian:—1. *Yen;* 2. *Tean;* 3. *Tedderte;* 4. *Meddert;* 5. *Pimp;* and ending with 20. *Gigget.*[2]

Any attempt to cross the breed with Blackface and other rams with the object of improving it as a mountain sheep has been unsuccessful, as the progeny is not so hardy.

The colour of the head and legs of the lamb when dropped should be black (spots being inadmissible), or more correctly very dark blue, and a shade of grey through it, but free from any tinge of brown or speckle; the body white, or preferably grey; white tips to the ears; and a fringe of white hair round the hoofs. The white extends from the starting-points indicated and forms rings which gradually develop round the muzzle and limbs, till at four years of age the face and legs are left either white, like the hoofs, or steel-grey in colour.

Points of a Ram.[3]—Horns generally present, but may be absent (they do not appear on the ewe), smooth, creamy white, and not too thick, coming out of the head well apart and well back. The ears, white or nearly so, should be sharp or pointed, and set well up as an indication of hardiness; the head a good size, broad in the forehead, nose well arched and broad; the cheek-bones deep; eyes bright; the face a light

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[1] Paper on the Mountain Sheep by the Rev. T. Elwood, M.A., rector of Torver, Coniston, Part I., *Transactions of the Cumberland and Westmorland Antiquarian and Archæological Soc.*, 1898; Garnett's *Westmorland Agriculture*, 1800-1900; and "The Herdwick Sheep" by A. E. Reid, M.C., etc., in *The Journal of the Ministry of Agriculture*, September 1921.

[2] The existence of these Cymric numerals in English-speaking districts of England and Scotland was brought before philologists in 1866 by Dr Alexander J. Ellis, Vice-President of the Philological Society. He eventually collected over sixty versions. On 7th December 1877, he read a long and elaborate paper on this subject before the Philological Society, printed thereafter in the Society's *Transactions* (vol. 1877-8-9, London, 1879, pp. 316-372). Ellis's account produced a number of contributions to the *Athenæum* of 1877 (part ii.) by Canon Isaac Taylor, Dr Bradley, and others. A paper read before the Society of Antiquaries of Scotland on 12th April 1915, by David MacRitchie, F.S.A. Scot., entitled "The Celtic Numerals of Strathclyde," gives a general survey of the question and embodies some new versions.

[3] Defined by the late John Newby, Aulthurstside.

"rag" (grey or rimy) or white in full-grown sheep, with plenty of white bristles on the back of the head, and a "toppen," not too large, on the forehead—a little one indicating wool, too much implies softness. The neck, carrying the head gaily, should rise well up from the shoulders, which are usually sharp at the withers, although a broad shoulder is preferable; the top or back straight and wide, and the ribs well sprung from the back-bone; the figure compact; the fore legs short, with plenty of bone and good big joints, but fine between, and big white hoofs and fleece; the hind legs in proportion; flat, clean shanks, with plenty of white bristles inclining upwards; the loins deep; and thighs muttoned well down to the hocks. The fleece should be genuine wool, not hair, the staple strong, with a mane like a lion's, standing well up round the shoulders and down the breast; the wool a good length on other parts, and knit together with a lash on the top. The first essential in a well-bred Herdwick is a good coat, and the next good bone. A few kemps in the wool when a sheep gets to six years old indicate the true Herdwick character. The animal should walk freely, and be square on his limbs in travelling to and from an observer, and have a good thick tail.

When turned up for examination to rest on his rump, he should have a wide breast keeping the fore legs well apart, and be well covered underneath with soft wool. The hind legs should lie flat on the ground and well apart. The best sheep are grey below, and they are none the worse for being grey all over the body, showing a grey "pelt" after shearing. Dark specimens are believed to be hardy.

The points of the female, making allowance for sex, are with few exceptions those of the male; but *strength* is the predominating feature in the ram, and *quality* in the ewe.

Management.—The ewes begin to lamb in the lower valleys about the middle of April, and as late as the beginning of May on higher farms, and 90 lambs to 100 ewes including 10 with twins is good. Before the war a ram was hired at from £1 to £2 for the season, or bought at £3 to £4, was put to 70 ewes, and all the live produce was grazed till three years old or more; now few wethers are kept beyond a year old. They are fed-off and top the market in weighing capacity, in quality, and in price. In 1919, the hiring of good rams rose to £4 or £5 for the season, and the price of rams correspondingly. It is also a custom to let out ram lambs to farmers to winter, who then have the option of claiming the use of them as rams free of charge for two years. Many rams and ram lambs are exposed for sale or hire at Keswick on the first Saturday in October, and at Eskdale on the last Friday in September. The districts of Keswick, Borrowdale, and Ennerdale are noted ram-breeding centres. Ewes from the hills clip round about 3 lb. of wool, hoggs and wethers 4 lb. or more, and rams 7 or 8 lb. The larger, softer, and more woolly varieties are found in the lowlands, and the hardiest and healthiest specimens, often very small, on the fells, where the pasture is of the scantiest and poorest description, containing much fern, which, in spring, is eaten to some extent in the early, tender, rolled-up stage, and "savin" (*Juniper communis*), which is the winter stand-by of the sheep in hard weather when "ling" heather (*Calluna vulgaris*) fails them, and practically nothing else can be got. The lips are at times so injured by the hard, sharp spines that they grow together and require to be severed with a sharp knife. **Ewes** on open hills do best to lamb first at three years old, but shearlings or "twinters" (two-winters) have in recent times been bred from in enclosed areas. There is no fixed age at which they are cast. They are selected by the condition of the teeth and the appearance of the eye. Those from the mountains go to the adjoining lowlands and into Yorkshire and Wales (where they thrive admirably) to breed cross lambs by Leicester or other Long-wool rams. The Down cross, though sometimes successful, has not gained much favour. The "wicks," gentles, or maggots of bluebottle flies have always been troublesome, but they became worse after the '87 Jubilee year, and involved incessant labour during gleamy summer weather in "shedding-in" the sheep to clean and hand-dress them about the tail and breeches, as well as to sprinkle their backs with a preventive mixture, such as a strong sulphur dip put on with a heather "kow," or sulphur and train-oil rubbed on lightly by the hand. Crude carbolic dips encourage the flies to strike, and give no protection. On some farms there is a considerable loss in lambs from balls of wool in their stomachs, taken in while they are sucking.

The hoggs are wintered in the low country from some farms at a cost of 8s. or 9s. each.[1] They leave in mid-October and return on "Hogg-day," 5th April; but on some high places they do so badly on their return after low-country feeding and flushing, that they are best wintered on hay on low ground at home. Different flocks keep their own ground, and do not mix much with neighbours, if sheep that tend to stray are regularly sold. The "homing" instincts of the Herdwick are strongly developed. Sheep taken to be dipped seven miles away quickly find their way home through intervening flocks, and even those sold into the low country sometimes return from incredible distances. Stray sheep are restored to their owners at various sheep fairs and ram hirings. To facilitate this, flock earmarks and smits of different colours are entered in detail in a *Shepherds' Guide*, which gives engravings of both sides of a sheep of each flock. The mutton is of super-excellent quality. Ewes when fat make 10 to 12 lb. per quarter, and wethers at three years old, 14 lb. on the fell. Rydal wethers go up to 18 lb. when fat.

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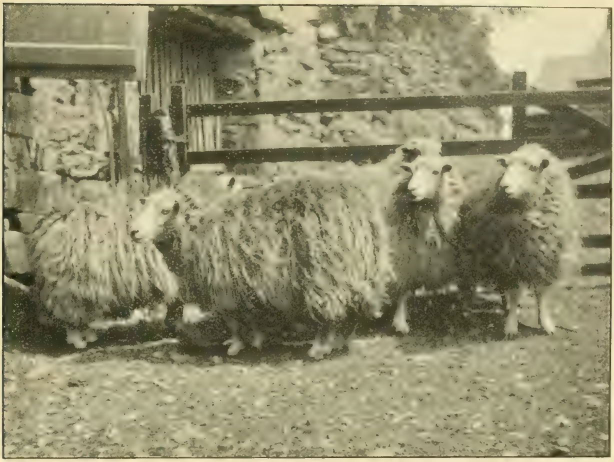
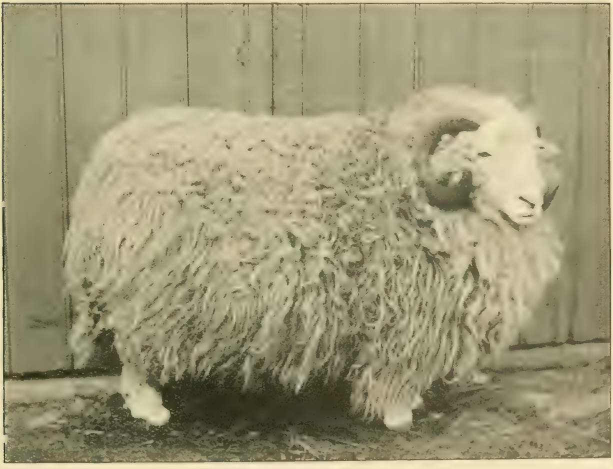
[1] Pre-war prices, 5s. to 5s. 6d.; war price up to 12s. 6d.

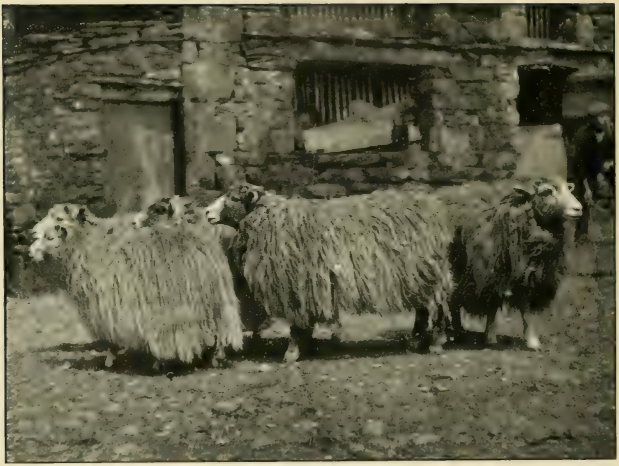


A. Herdwick Ewes.
With faces nearly white, and strong wool (used for carpet-making).
The property of Wm. Bowness, High Yewdale, Coniston, Lancashire.

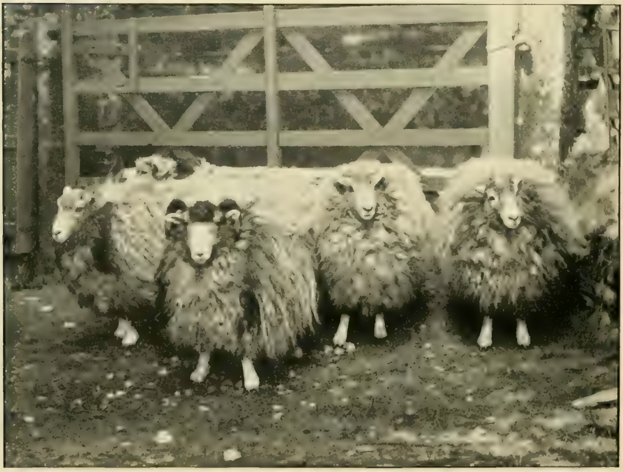


B. Herdwick Ram, "Kelso."
Many prizes; twice First at the Royal Show—at Carlisle, 1902, and at Park Royal, 1903.
Bred by John Bennett, Sillathwaite, Kinneside, from a sire bred by Newby, Muncaster Head, and sold in 1902 to Mackreth, Ambleside.

[*Alex. Booth, Hensingham.*



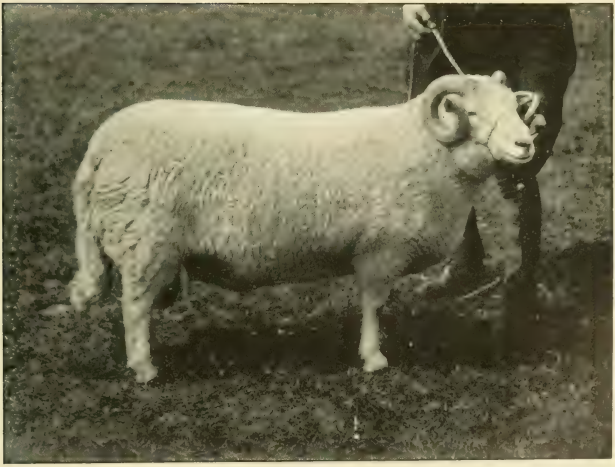
A. HERDWICK GIMMER HOGGS.
With faces still dark. Sheep accustomed to run on the open fell, summer and winter.
The property of Mrs Bowness, High Yewdale, Coniston, Lancashire.



B. HERDWICK SHEARLINGS.
Faces lighter than as hoggs. The ram took First at the Cambridge Royal as a shearling, and the ewes First at Eskdale as lambs.
Bred by Rt. Hon. Lord Muncaster, Muncaster Castle, Robinglass.

A. WELSH MOUNTAIN SHEEP, A BREED OFTEN USED IN SHEEP-DOG TRIALS.

[*J. L. Newman, Berkhamstead.*

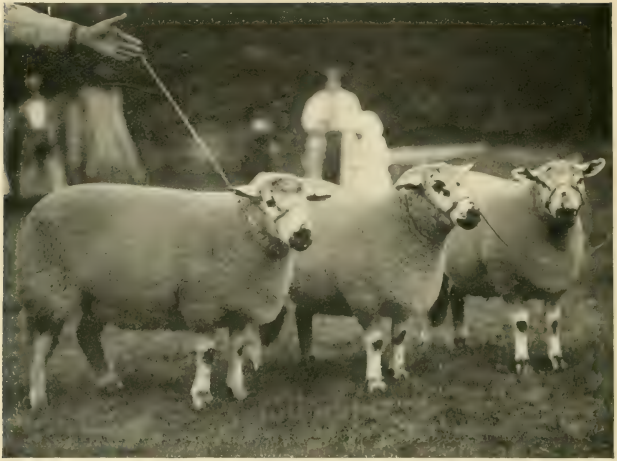


B. WELSH RAM.

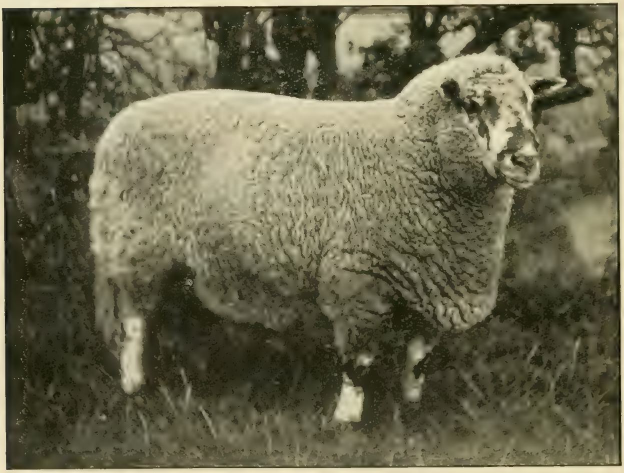
Won First, Shropshire and West Midland, and Second, R.A.S.E. Show in 1903.

Owned by Conwy Bell, Rhuddlan, N. Wales.

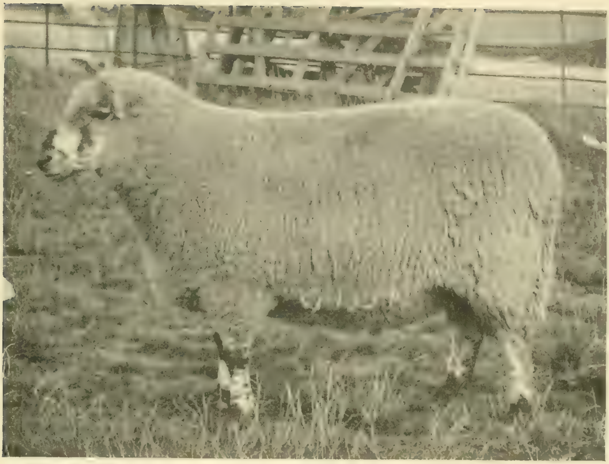
[*G. H. Parsons, Alsager, Cheshire.*



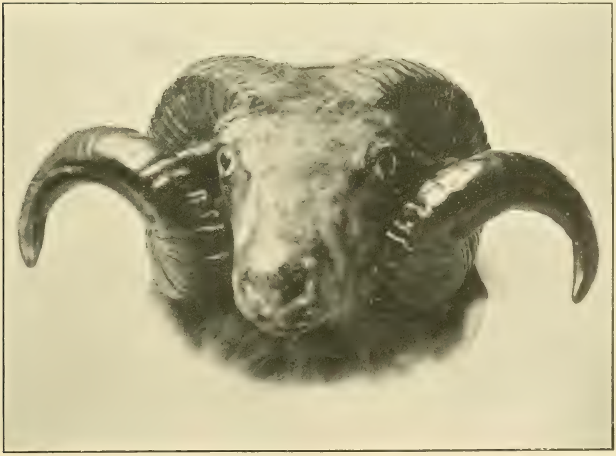
A. KERRY HILL EWES.
First at Hereford, 1921. Owned by A. H. Whittall.
[" *Agricultural Gazette Photograph.*"



B. KERRY HILL RAM, "CHAMPION SAM" (44).
First prize, Shropshire and West Midland Show, 1899, and many other prizes; never beaten.
Bred and owned by Evan Kinsey, Maesmawr, Caersws, Mont.

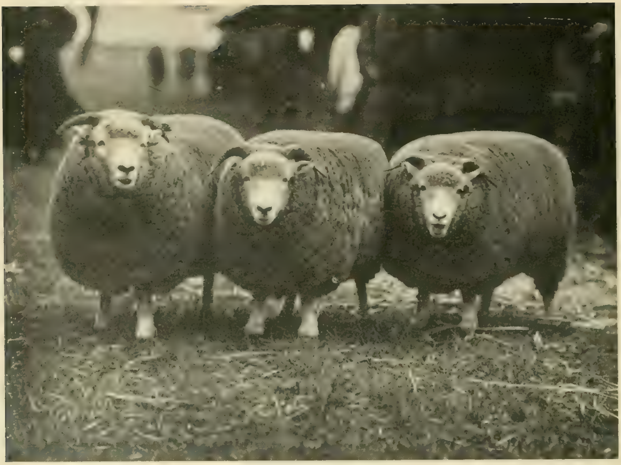


A. Radnor Ram.
Prize-winner at Builth and Wells Agricultural Show, 1903.
Bred by Thos. Davis, Dronolan, Builth, Wells.

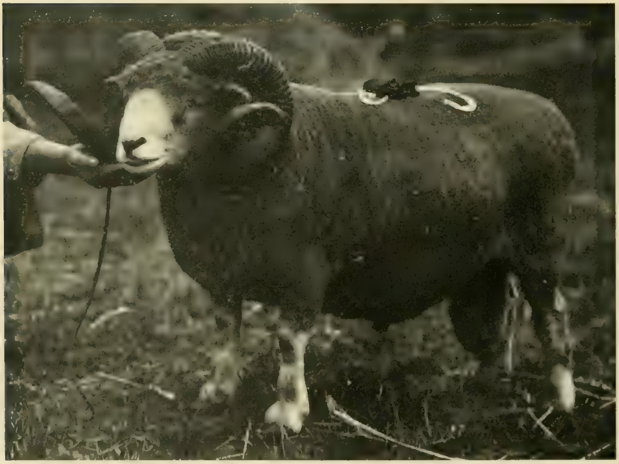


B. Penistone Ram's Head. (See Plate CLXXI.)

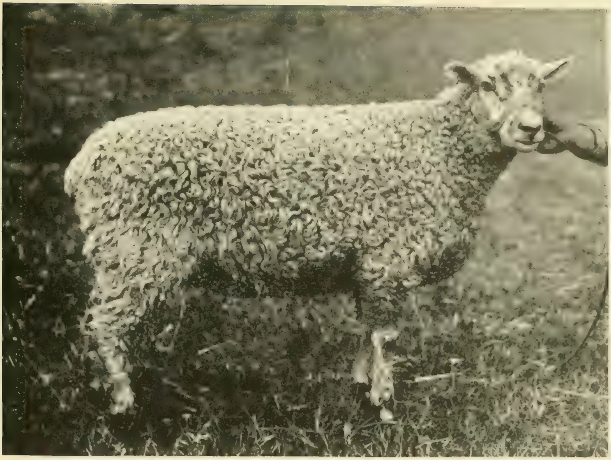
[*J. W. Duckett, Penistone.*



A. Exmoor Shearling Ewes.
First prize pen at Cambridge Royal, 1922. The property of P. Everard.
[" *Agricultural Gazette Photograph.*

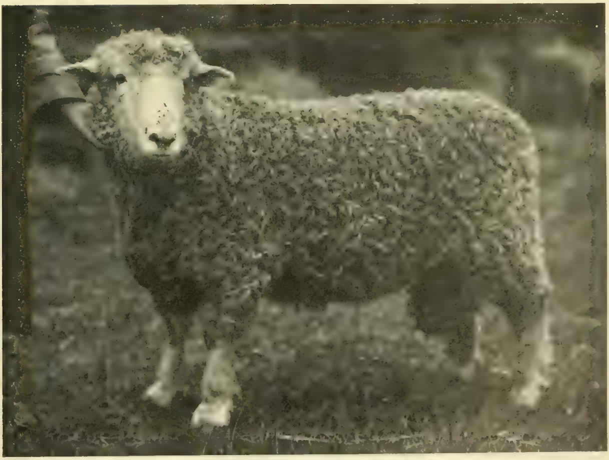


B. Exmoor Ram, "Great Hele," 4 years old.
First at Cambridge Royal, 1922. Owned by F. C. Gill.
[" *Agricultural Gazette Photograph.*"



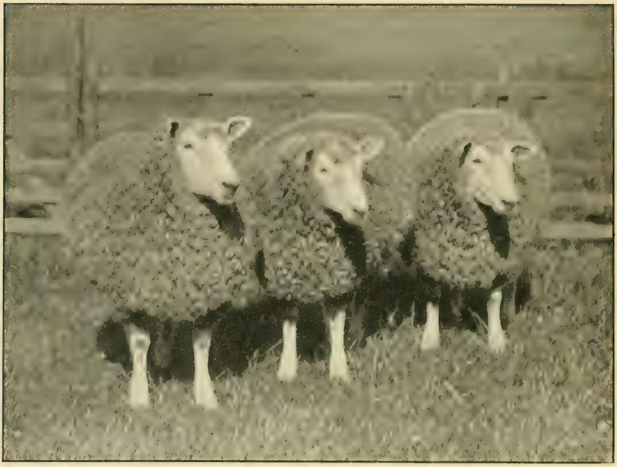
A. Dartmoor Ewe.

[*C. Reid, Wishaw.*

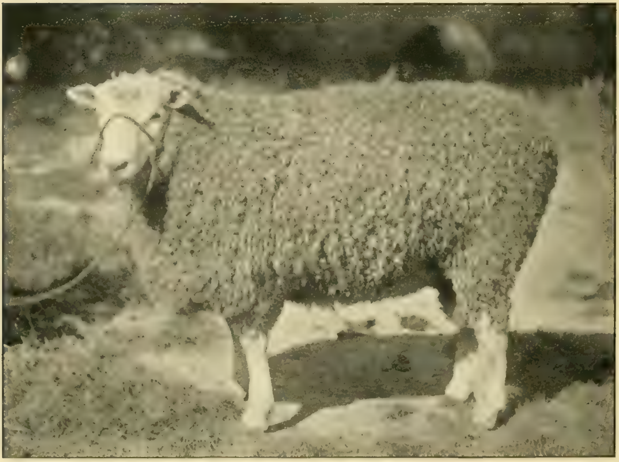


B. Dartmoor Shearling Ram.
First at Cambridge Royal, 1922. Owned by R. R. Daw.

[*"Agricultural Gazette" Photograph.*



A. English Leicester Shearling Ewes.
Owned by W. A. Brown, Elms Villa, Driffield, Yorks.



B. English Leicester Ram.
First prize at the R.A.S.E. Show at York, etc., 1904.
Bred by E. F. Jordan, Eastburn, Driffield.

Wethers used to be kept till four or five years old before the fall in the price of wool. It went down to 4s. 3d. per 17½ lb. (the local stone) in 1901-2 from the highest point, 20s. about twenty years before. It rose to 10s. 3d. in 1904, and prevented the threatened depletion of Herdwick stocks. At 3d. per lb., making a return of 9d. per sheep, the wool from 1000 sheep only amounted to £40, which was not sufficient to defray the cost of wintering the hoggs. The sheep generally go with the farm and belong to the landowner, who receives 5 per cent. on the value of the sheep as additional rent. The number of sheep which each tenant was permitted to run on the fell or common land was at one time restricted to the number the rented enclosed land was capable of wintering, but the regulation being relaxed led to overstocking in some cases, which necessitated readjustment by regulation on the enclosure of commons, which has greatly improved the poorer types of the breed. Sheep-shearing is generally done by a gathering of neighbours, who in turn help one another, a practice at one time in general use in Scotland. After the day's work is over, "a plentiful feast is followed by songs and jollifications in true Cumbrian heartiness."

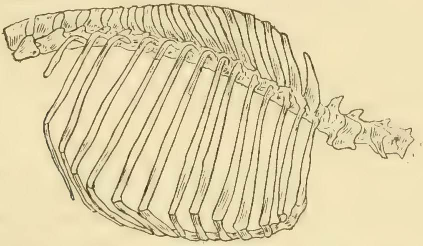


FIG. 75.—SKELETON OF THE THORAX OF A HERDWICK SHEEP, showing an additional (14th) floating ventral rib.

(Drawn from the photo of a preparation made in the Anatomical Department of Edinburgh University, under the direction of Prof. Cunningham.)

On Gaitscale or Crinkle Crags, belonging to Black Hall Farm, at the head of Duddon Valley, Ulpha, Cumberland, near Broughton-in-Furness, Herdwick ewes are from time to time found with fourteen ribs on each side, or fourteen on one side and thirteen on the other. The peculiarity is becoming less frequent under the influence of imported rams from a distance which possess the normal number of thirteen ribs on each side.

New-born lambs when found are often dressed with sheep salve (a mixture of equal parts of grease and Archangel tar) to protect them from foxes, which are too numerous in the more inaccessible mountains. "Several packs of foxhounds, which are boarded out among the farmers either for the whole year or the off-season, hunt and kill a large number of foxes."

There are other curious customs in the management of this breed which are not commonly met with, such as smearing the teats of the ewes with plaster of pitch when it is desired to prevent the lamb sucking; and ruddling the wool of show sheep and making the rams a bright red colour, so that the shepherd is enabled to distinguish them in uneven hilly ground, even three miles away, by the aid of a field-glass.

The first *Flock Book* published by the Herdwick Sheep Breeders' Association, in 1920, contained 1920 registered flocks of breeding ewes numbering 13,600, and left many yet to come in; the second appeared in 1921.

Among Prominent Breeders are:—John Edmondson, Seathwaite, Borrowdale, near Keswick; William Birkett, Gillerthwaite, Ennerdale; John Harrison, Brotherilkeld, Boot, Cumberland; Edward Nelson, Gatesgarth, Buttermere; Simpson Richardson, Taw House, Boot; John Rothery, Wasdale Head, Gosforth; Isaac Thompson, Whythburn; William Wilson, Wathendlath, Borrowdale.

The Welsh Mountain Sheep.[1]—This breed has existed on the Welsh hills, it may be said, from time immemorial. On the highest hills the old breed still exists in its pristine purity of blood, though the type varies somewhat as does also the quality of the sheep according to the nature of the pasturage. In the lowlands, including the richest pastures of the country, the breed has been increased in size and modified to some extent (though the general characteristics have been well maintained) by crossing with various larger early-maturity breeds. The improvement of the breed on the hill has been restricted by the fact that much of the mountain land is common pasture, where it is impossible to secure united action on the part of the various owners of stock. Many of the larger "sheep-walks" are unenclosed, and owing to the tendency of bought-on Welsh sheep to stray and to die before becoming accustomed to the ground, an extra price of 5s. to 8s. above the market value was freely given before the war by an incoming occupant for the sheep bred on the land. This is in the same direction, but does not go so far, as the custom in the Highlands of Scotland referred to at page 599.

The crossing of a mountain breed of sheep with an improved early-maturity breed, which invariably possesses a less hardy constitution, can only be regarded as an improvement when it is possible to place the mountain sheep in a position where it will be independent of severe weather and scarcity of food, which, by the application of Darwin's law of the survival of the fittest, exercises an immense influence in forming the character of a mountain sheep.

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[1] The Author is indebted for much of the following information to Owen Price, of Nantbyrham, Cray, Brecon, and Professor Gilchrist.

The **characteristics** of the **pure breed** are, a tanned face and legs (which, however, must not be too dark), short fine wool, and usually a narrow body tapering towards the shoulder. The rams possess gracefully curved horns, while the ewes are generally hornless. The breed is noted for hardiness and for an activity that renders it difficult to fence in those taken down to the lowlands to feed. Fell sheep can easily jump a six-foot wall. The mutton in the London market is regarded as of the finest quality, and classed with Scotch mountain mutton and that of the South Down.

The dead-weight of the real pure-bred Welsh sheep does not exceed 28 to 32 lb., but specimens of the "improved" variety, run up to 36 or 40 lb., and on the best pasture even up to 50 lb.

In 1905 the **Welsh Mountain Sheep Breeders' Association** was formed, with J. Marshall Dugdale, Llwyn, Llanfyllin, as president. When the *Flock Book* appeared in 1906, twelve governors and twenty members in all had joined the Society. The previously accepted description of Welsh sheep was modified "in order to meet the requirements of very high mountain flocks as well as the more lowland ones." The following **distinguishing characteristics** of a Welsh ram are extracted from Vol. I., page 11:—*Head* masculine, wedge-shaped, tapering towards the nose. *Face* slightly tanned or white. *Forehead* broad. *Muzzle* preferably black. *Horns* fairly strong and well curved, not too close at the roots. *Eyes* prominent and bright. *Ears* small and thin, obliquely set. *Shoulders* nicely rounded and level with the back. *Tail* long, strong, and bushy. *Legs* fine, comparatively short and slightly tanned, or white. *Skin* pink, with mellow touch. *Wool* white, short, thick, firm to handle; a small proportion of kemp not to disqualify.

The influence of crossing has been to produce thicker sheep of "square" and equally-balanced frames, which in suitable localities, where turnips and other artificial food can be conveniently provided, return more profit than the pure breed under liberal treatment. The great differences in size and appearance are accounted for by the different breeds used in crossing. In Anglesey and South Carnarvonshire, where the largest sheep (running up to 15 and 20 lb. per quarter) are to be found, Leicester and Lincoln blood has been introduced; and on the highest hills in Breconshire the Cheviot cross has proved to be hardy and suitable to the surroundings.

The weight of the Welsh fleece differs with the size and character of the variety of the breed producing it, from 2 lb. up to the weight of the larger English Down fleeces, the staple of the improved specimens being longer and more open as well as heavier.

The russet-rooted wool called *gwar goch*, which may be seen in lambs in front of the top of the shoulder, may be eliminated by careful breeding. The famous Welsh flannel, Welsh shawls, and woollen goods of various sorts are made from those parts of the fleece which yield the finest of wool fibre.

Mountain flocks range on the hills from April to November, but come down to the low land during the winter months. The ewes are generally cast at four years old, and crossed usually with Shropshire, South Down, Kerry Hill or other rams with the object of producing fat lambs for the May market.

The Kerry Hill (Wales) is, next to the Welsh Mountain, the most important of a number of recently improved breeds of Welsh sheep. It derives its name from a continuous range of hills extending 15 miles east and west through the parish of Kerry (22,000 acres) in Montgomeryshire; although registered flocks are also found in Radnor, Hereford, Salop, Worcester, Denbigh, Brecon, and Cheshire. The annual fair of the village of Kerry, near Newtown, had been held from time immemorial on 16th September, but since the formation of the Kerry Hill Sheep Breeders' Association the official sale of registered sheep has been fixed for the first Friday in September, "when drafts of ewes, rams, and ram lambs from all the leading flocks are offered for sale, at one of the finest shows of sheep in the kingdom," the auctioneers being Morris, Marshall & Poole, Welshpool and Newtown, North Wales, the Secretaries of the Flock Book Society.

The **foundation breed** of the Kerry Hills was described in 1809 in the *Agricultural Survey of North Wales*, "as the only sheep which produces perfect wool, that of every other Welsh breed being more or less mixed with 'kemp.' . . . The characteristics of the breed are large, woolly cheeks, white bunchy foreheads, whitish heads covered with wool, no horns, and a beaver-like tail. They are very hardy and comparatively tame, and not so disposed to ramble as most other hill sheep. In shape, however, they lack compactness and symmetry. . . . They weigh when fat from 10 to 14 lb. per quarter."

Thomas Halford, Newtown, North Wales (to whose historical notice of the breed, written in 1898, indebtedness is acknowledged), says that the Kerry Hill sheep about 1840 were "larger and heavier wooled than the pure Welsh sheep," had "nice heads, with white faces and legs, but in many cases speckled with small black spots, or they had self-coloured tan faces, with legs to match." The wool on the body was fine, but so very coarse below that it was always separated from the fleece and sold at a lower price. After the enclosure of the farms by the proprietors, especially near Kerry Pole,[1] many tenants bent on improving their flocks went, between 1840 and 1850, to Knighton Fair to buy rams "at from £1, 10s. up to the extravagant price of £3." The concurrent extension of root cultivation and a general improvement of agricultural practice led to "a notable improvement of Kerry Hill sheep, as somewhat similar circumstances had led to the development of the South Down breed (p. 674). From about 1855 Kerry farmers ceased to go to Knighton for their stock rams." They could do better by exchanging rams among their own flocks; and soon the farmers from about Knighton came to Kerry for their rams and paid much higher prices. Thus the "Clun Forest sheep with the slightest possible amount of cross, and that only of the Shropshire," was used to improve the Kerry Hill sheep, which "took about twenty-five years to evolve," and, in turn, the Kerry Hill sheep was meanwhile drawn upon for the regeneration of the Radnor breed in the Knighton district. It is claimed "that the beautiful and distinctive speckled faces of these sheep have been retained and increased from 1840 by selection rather than by crossing," and the hardiness of certain strains of this improved breed points to the presumption being correct. The Kerry Hill sheep is now recognised as a distinct breed, although it has no longer any right to be regarded as a Hill or Mountain sheep in the sense that it can live all the year round on high exposed places without being hand-fed on roots and hay.

Professor D. D. Williams, in the *Farmer and Stock Breeders' Year Book*, 1907, says :—" The chief characteristics[2] of the breed at the present time are: speckled or mottled face and legs [black and white, not too black], compact body, a clear pink skin, with a close, tight fleece of good wool averaging from 5 to 8 lb. per fleece, and a long bushy tail."

A. Sparrow, of the "Butchers' Hide, Skin, and Wool Company, Limited, Birmingham," writes :—" Kerry wool would be equal to the finest wool we have if it were not for the Welsh cross in it which throws a thread of kemp, especially in the britch."

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[1] In estate improvement special credit is due to the late John Naylor, who, following the object-lesson of a previous owner, Wm. B. Pugh, during a period of thirty years on the Brynllywarch estate, took a leading part in fencing the hill pastures, draining the lowlands, and providing the buildings necessary for an improved system of farming. Those examples were followed by David Davies, M.P., on Gwernygoe estate, Edward Davies, of Plasdinam, and others.

[2] Fully detailed in Vol. V. of the *Flock Book of Kerry Hill Sheep*, 1905.

Relative prices per lb. of wool of related breeds before the war and after, were:—

Shropshire,	up to	13⅓d.	in Feb. 1907, and	59d.	in Feb. 1920.
Kerry Hill	„	12½d.	„	53d.	„
Clun	„	11½d.	„	47d.	„
Radnor	„	11d.	„	40d.	„

The *Flock Book of Kerry Hill Sheep*, edited by William Langford of Chirbury Hall, was first issued in 1894 by the "Kerry Hill Sheep Breeders' Association and Flock Book Society," but after a period of hesitation by the breeders, was reissued in 1899 with a membership of 26. It is intended to "preserve the true character, quality, and type" of what it claims as "the best of all 'Hill sheep.'" The objects of the Society are to get the breed recognised among the breeds of the United Kingdom, and to promote the breeding of first-class rams, so that eventually it may be possible to secure uniformity in quality and in colour of face. As the result of the permanent establishment of the *Flock Book* and the system of registration, the Society has increased yearly in membership to over 200 in 1920. It is affiliated to the "National Sheep Breeders' Association," and it had for the first time four classes allotted to the breed at the Royal Show at Lincoln in 1907.

"The **ewes** are easily kept, extraordinary sucklers, and in addition to rearing or fattening their lambs, grow and thrive rapidly when depastured on the lowlands." Halford says that "more than sixty years ago, thousands of draft ewes of Clun Forest and Kerry Hill sheep were taken into Essex and other eastern counties for crossing, principally with Leicesters, for the production of fat lambs for the London market. The ewes were splendid nurses, the lambs nice weights, not too large, and the dams fattened-off quickly after their lambs left them. The wethers kept until five or six years old went, when drafted, into the parks, home farms, etc., to make unsurpassed mutton for the tables of the upper classes."

So widely has the breed grown into favour that registered flocks are found in Salop, Radnor, Brecon, Hereford, Monmouth, Glamorgan, Pembroke, Cardigan, Carmarthen, Denbigh, Anglesey, Cheshire, Gloucester, Worcester, Somerset, and Norfolk. The ewes after rearing their lambs go chiefly to the Midlands, but also as far as Essex and other distant counties, to breed fat lambs by Shropshire, Oxford, Hampshire, and South Down rams.

At the Smithfield Fat Stock Show 1919, three yearling wethers bred and exhibited by Capt. J. M. Naylor, Leighton, Welshpool, carried off against other breeds the Challenge Cup, and were sold for the record price of 67 guineas.

The **Radnor breed** was described in the 1893 edition of this work as **the Tanface**, a very old Welsh Mountain breed. The Radnor has ceased to exist as a distinct breed, only a few being seen. The present so-called Radnor sheep so popular with many for breeding fat lambs, are mainly speckled-faced crosses.

The **Clun Forest breed**, although related through Shropshire and Long Mynd (or Mound) ancestors, differs from the Kerry and Radnor breeds. It belongs chiefly to the Clun district of Shropshire. The original Clun Forest sheep was small and speckled-faced. Its modern representative was produced by crossing with hardy, blackfaced Long Mynd mountain rams, now extinct, and latterly with Shropshires. It is now three parts Shropshire, and may rank as a hardy variety of that breed specially suited to its local surroundings. The ewes are excellent mothers; they produce Easter fat lamb, which would weigh, if kept till early summer, 17 to 18 lb. per quarter. Ewes and two-year-old wethers rise in weight to 28 lb. per quarter. The wether mutton is sold in the "West End" as Welsh, dressed with a tuft of wool on the tail left its full length to show that the mutton belongs to a semi-mountainous breed.

The Exmoor Horn sheep[1] has existed from time immemorial on the Exmoor and Brendon Hills in West Somerset and North Devon. **Charles Vancouver**, in a *Report on the Agriculture of Devon*, 1808, states that—

> "The common Exmoor sheep are generally preferred in the open and more exposed parts of Exmoor, owing to their extraordinary hardiness, and the activity with which they continue working in search of food. The wethers at two and a half or three years old make delicious mutton, weighing from 12 to 15 lb. per quarter, and commonly shear a fleece of from 4 to 5½ lb. of unwashed, moderately long, staple wool (value, 9d. per lb. against washed wool about 13d.), which, before the cloth manufacturers fled from this part of the country into Yorkshire, was much used by them. The wool of the third-cross with the merino was three times the value of the native fleece, and the carcase is stated to have been rather improved."

Professor W. C. S. Spooner wrote in 1844, "that the Exmoor and the Dartmoor sheep are the principal forest breeds in the West of England, located in the higher situations of Devon and Cornwall, a hardy race, adapted to the poverty of the pasture which the forests of Dartmoor and Exmoor afford. Though bred on the heath, they are fattened in the

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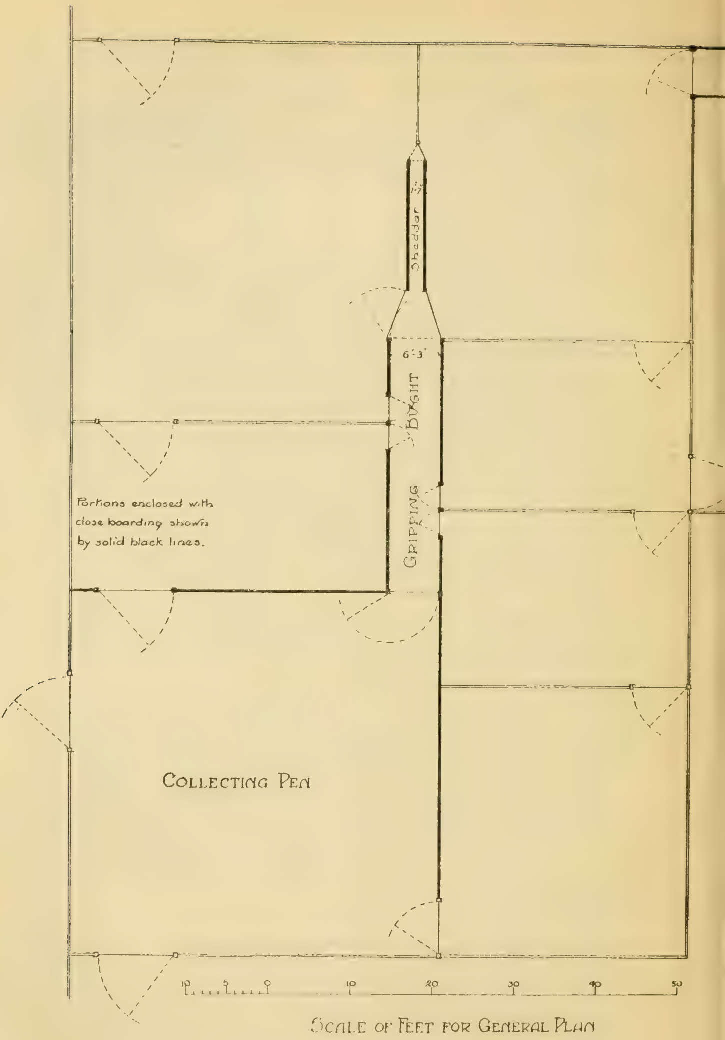
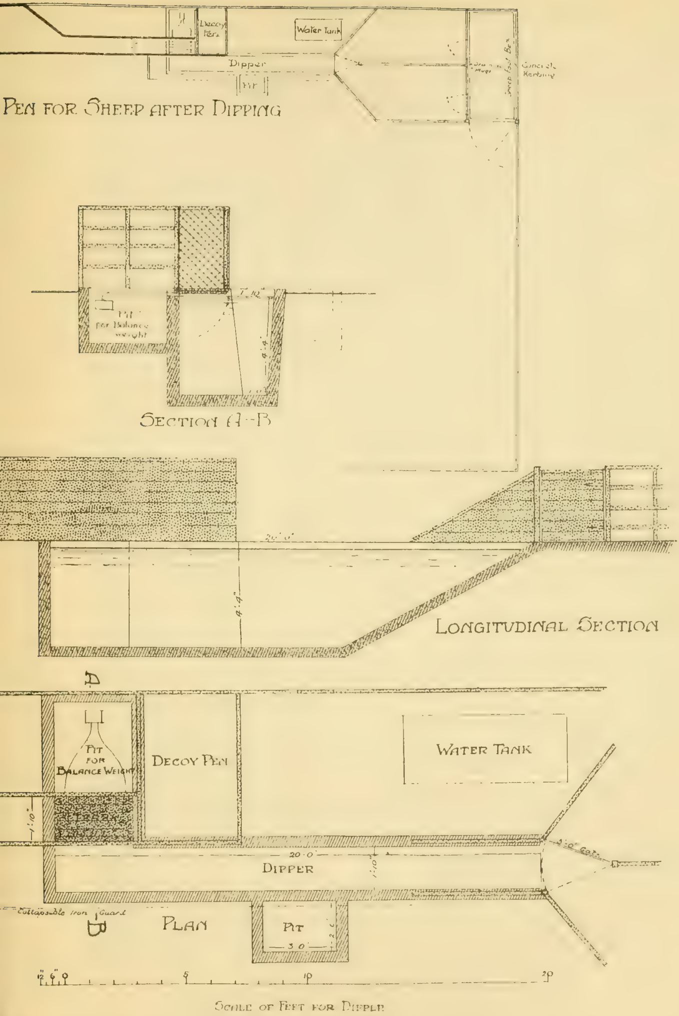
[1] Condensed from notes extracted from the historical preface to the first volume of the *Flock Book*, edited by W. Dicker, for the Exmoor Horn Sheep Breeders' Society, 1907.



Portions enclosed with close boarding shown by solid black lines.

FIG. 76.—MODERN SHEEP FO

From plan kindly supplied by John Blackley, Lochfield, Dumfries, who is the designer of th
are placed to draw the others on to it. (See also page 732.) The positions



WITH DIPPER INCLUDED.

-date Fold, including a dipper with trap platform and decoy-pen in which a few sheep various sections and important details are clearly indicated on the plan.

plains. The Exmoor is rather smaller than the Dartmoor, and the ram has a beard somewhat like that of a goat,[1] which it much resembles in habits, activity, and boldness. In other respects the breeds are alike. The ewes of both take the ram early."

In *The Farming of Somersetshire*, the late **Sir Thomas Dyke Acland**, in 1851, wrote of the Exmoor as "a native breed known as Exmoor or Porlock. The hill-country farmers generally keep a breeding flock of ewes and a flock of wethers to run on the hills. The general yield of wool is 5 lb. Sheep from an ordinary flock, when fat, weigh from 11 to 12 lb. per quarter; from an improved flock, they may reach 16 to 18 lb. a quarter." Another writer speaks of them as "a breed of sheep with [black muzzles], white faces and legs, taper horns curving downward and outward, close-set, long-stapled fleeces, with wool up to the cheeks, a peculiarly rounded instead of square-formed carcase, broad loins, though with slack girth behind the shoulders, and high necks. The original Exmoors milk better than the improved, old ewes especially, but young ones, if they are well kept at tupping-time, are very prolific. There are instances of ewes rearing three lambs well after the first fortnight." The ewes are always brought down to the lower ground to lamb, and get a few turnips and oats, and they come in again from the hills in November to the poorest enclosed lands. They lamb at two years old, and have the reputation of being good mothers. They are generally drafted after three crops of lambs. Exmoor sheep have been exhibited for many years at the Royal Agricultural Show, the Bath and West of England, and the Somerset and Devon county shows. *The Bath and West Journal*, 1860, states that the Exmoors exhibited at the show "were greatly admired, not only for their symmetrical proportions and the quality of their flesh, but also for their wool, and an adaptation of form to mountain districts." The farmers who occupy farms lying between 900 and 1300 feet above the sea, are careful to breed from ewes of good constitution, with rain-resisting wool, and capable of producing lambs that can be fattened as hoggs. The **Exmoor Horn Sheep Breeders' Society** was founded in 1906.

Youatt says that "both the Dartmoor and the Exmoor sheep owe much to the cross with the New Leicester, with respect to early maturity, increased size—so far as it is desirable—and a far more valuable fleece."

The **Dartmoor** is the largest hill or moorland sheep in the country. It has been bred in its native district (both sides of Dartmoor) by the fathers and grandfathers of its oldest present-day owners, and is a very old breed which, like many of the Long-wools of the country, was improved years ago by a dash of Leicester blood. The size has increased and the quality of both flesh and wool has gone up in recent years by careful breeding and selection. The flocks winter on grass and a little hay. Nothing but show sheep get corn or roots. The ewes lamb about the end of February or beginning of March. The Dartmoor winters are so long that few breeders attempt to produce fat lamb, but the cast ewes go to little farms more favourably situated, and, being exceptionally good milkers and accustomed to rough it on the moors, produce the best of fat lambs by Down or South Devon rams while preparing themselves for the butcher.

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[1] "This characteristic has now disappeared."—W. DICKER.

Dartmoor fat wethers are usually sold between one and a half and two years old, and average about 20 lb., while some run up to 24 lb. per quarter.

The breed is preferably hornless, but now and then a ram develops little backward-pointing horns about 2 inches long. They are good travellers, big, long, and strong legged, long and strong necked sheep, firm to touch, and well fleshed all over, with good scrag and neck vein. The *head* is large and well proportioned; the ears a good medium size (not too small, else the sheep will be small), well covered inside and outside with hard hair showing dark spots, and set on almost level, not flat but doubled in and placed so that an observer can see inside as the animal looks at him. Dun patches on the hair of the face are objected to, but black spots of hair on the face growing on a black spotted skin deepening towards a black muzzle, and also a few spots round the eyes, are characteristic. The wool, often 15 inches long, beautifully fine in quality and very strong when tested by breaking, is like that of the Devon Long-wool in staple, but finer and more even all over and more wavy or curly. It extends over the "spall" and well down at the knees and hocks, and a little appears on the hind legs. The skin underneath is a clear pink colour, spoken of as "bright red." The usual average weight of fleece is about 15 lb. for ewes in some of the best flocks, like that of H. J. Kingwell, Great Aisle, South Brent, Devonshire, to whom indebtedness is acknowledged for the foregoing information about breeds.

Plan of a Circular Sheep Yard erected at Whakaki, Napier, New Zealand, by F. MacRae, for the late John Hunter Brown; suitable for three men handling a flock of 4000 sheep. By means of the three swing doors, located at the end of the "race" or shedder, one man can separate a flock into four divisions. To divide the two smallest lots of sheep, he uses the central door, so that he seldom requires to move his hands. The two 4 feet alleys beside the tree are employed when sheep are being branded or handled for fat. Other sheep

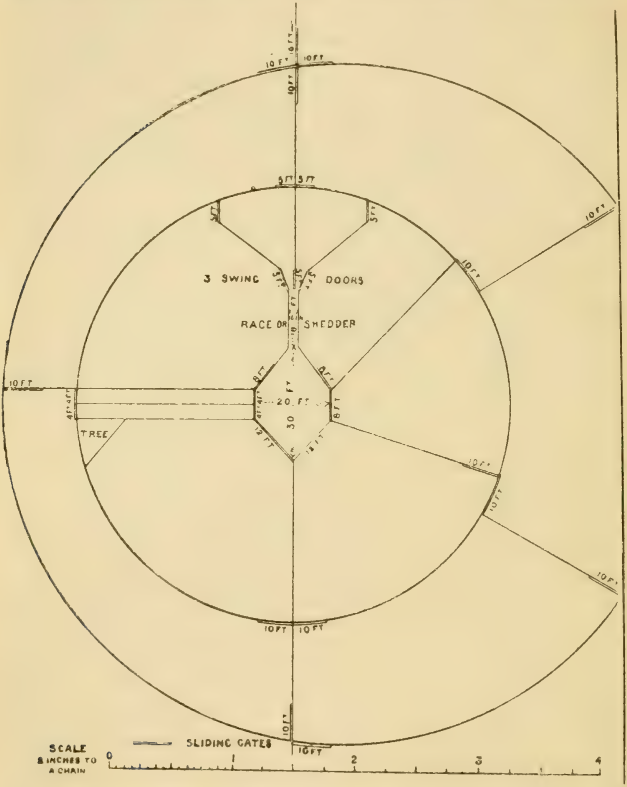
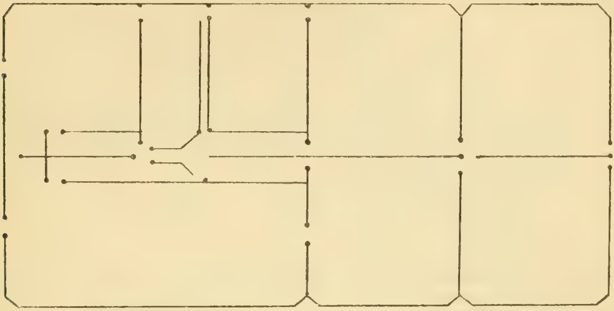


FIG. 77.—PLAN OF A CIRCULAR YARD FOR HANDLING 4000 SHEEP.

pass through the yards without being caught or touched by hand. All gates marked with a double line on the plan, open, with the exception of the three swing doors, by sliding to one side without crushing the sheep, and being in line with the fence are out of the way when open.

Plan of a Rectangular Yard, 90 yards by 45 yards, for drafting into three lots.



SCALE, 68 feet to 1 inch. [*W. Cooper and Nephews.*]

FIG. 78.—PLAN OF A RECTANGULAR YARD FOR HANDLING 5000 TO 6000 SHEEP.

CHAPTER XXIX

SHEEP (*continued*)—BREEDS OF LOWLAND LONG-WOOLS

English Leicester—Dishley Sheep Society—Border Leicester—Wensleydale—Lincoln—Lincoln-Merino, or Corridale—Kent, or Romney Marsh—South Devon Long-wool, or "South Dum"—Devon Long-wool—Cotswold—Roscommon.

Breed Histories and Characteristics

THE **English Leicester** is the leading type of the various Leicester breeds. It possesses the property of weighing more than the appearance would indicate, and it has a small amount of bone in proportion to carcase. It has been longer an improved breed than any other Long-wool, with the possible exception of the Cotswold. Bakewell accomplished the formation of the improved breed at Dishley, near Loughborough, in Leicestershire, and hence the name of Dishley at first associated with the breed. He began operations on a definite plan about 1755, and, in his usual jealous and secretive way, gave no one his confidence. He took advantage of the extension of the cultivation of the turnip as a field-crop supplying abundance of winter food, to transform the old ungainly slow-maturity Leicester, which had been bred merely for size and a heavy fleece, into a compact, symmetrical, moderate-sized animal, possessing great aptitude to fatten, and, above all, a marvellous power of communicating its tendency to early maturity and its refining influence to those breeds with which it was crossed with a view to their improvement. He began by selecting animals nearest to the type he aimed at—"those possessed of the most perfect symmetry, with the greatest aptitude to fatten, and rather smaller in size than the sheep then generally bred." The value of the carcase was the chief aim, and the fleece was a secondary consideration. He fixed and improved what came to his hand by in-and-in breeding. There is no evidence in support of the assertion that he "crossed his Leicesters with different sorts of sheep." Marvellous results were got by his methods and the matchless skill he instinctively had in mating breeding animals. He originated the practice of **letting rams for the season**, in place of selling them outright, which retained a large number of sheep from which to select what was required for breeding to different types of his own flock. The advantage extends also to the hirer, who can often acquire through hiring a share of the services of a better animal than he could afford to buy, and also secure a more frequent change of blood. So much was the system opposed, that the first ram Bakewell let about 1760, only realised 16s., and two others were hired on the same day at 17s. 6d. each. For many years only a guinea, and "on rare occasions two or three," for the use of a ram were got. It took twenty years to convince his neighbours of the success of his mysterious ways of breeding. In 1780, "he received 10 guineas for the hire of some of his choicest rams," and so rapidly did they gain in popularity that in 1784-5 the rate had risen to 100 guineas. In 1786 he let two-thirds of the services of a ram for 200 guineas, and received in all 1000 guineas for ram hires. "In 1789 he made 1200 guineas by three rams, 2000 guineas by seven others," and 3000 guineas for the remainder. His highest recorded reward was 800 guineas from two breeders for two-thirds of the season's services of a favourite ram, "Two-pounder." According to Marshall's *Midland Counties* (1790), an immense business in the hiring of rams soon sprang up:—

> "The ram was placed in a small enclosure with two ewes. The ewes in season were brought to him singly, and each was served once only; by this means, from 100 to 120 instead of the usual number of 60 or 80, were served by one sheep in the course of the season. The hirer was expected to keep the ram well, to permit him to serve none but his own ewes, and only the stipulated number of them, and to send him home safe about the beginning of December. The owner, on receiving him, immediately set to work to get all his former fat upon him, and to make him look as handsome as ever for the next show."

At these fairs men selected the sheep for their purposes, and offered the sums they were prepared to give to the owners who were in attendance.

The Dishley Society was formed with rules of extraordinary stringency, dated 1790, for the preservation of the purity of the new Leicester breed, but it attempted to create a sort of monopoly to promote the interest of a small ring, consisting of Bakewell and his friends. No member could hire or use a ram that did not belong to one of the twelve members; or let rams at less than 10 guineas, or to ram breeders at less than 40 guineas; or in greater number than thirty in one year; or sell to outsiders, ewes or rams of his own breed to breed from, unless he sold the whole flock; or show his rams to others except at specified times. The only unselfish condition worthy of notice and special study was that "no member shall give his rams, at any season of the year, any other food than green vegetables, hay, and straw." There are not a few ram breeders of the present time who would be the better for Bakewell's autocratic interference with their methods of discharging the trust which nature has confided in them.

Such **fame** did the **Dishley Leicesters** acquire, says Youatt, that—

> "Within little more than half a century they spread over every part of the United Kingdom," and "at the present day (1837) there are very few flocks of Long-wool sheep existing in England, Scotland, or Ireland which are not in some degree descended from the flock of Bakewell, although some flocks of the pure Cotswold breed remain. No other sort of sheep possesses so great a propensity to fatten, or is fit for the butcher at so early an age. On good keep it will yield a greater quantity of meat for the same quantity of food than any other breed of sheep, but they cannot travel far for their food, nor can they bear, so well as many others, occasional scantiness or deprivation of nourishment."

The mutton was never in high favour either with the butchers or the consumers, being coarse in the grain and "somewhat insipid," though "tender and juicy when not over-fattened." **Other drawbacks** were the scarcity of doubles, owing to the preference shown to large single lambs at the period when high prices ruled, and the discarding of ewes that bore twins; deficiency in milk secretion; delicacy of constitution; shortness and lightness of fleece. The redeeming feature of the breed "consisted in the improvement which it effected in almost every variety of sheep that it has crossed." The line of limitation was drawn by Sir John Sinclair, when he wrote:—

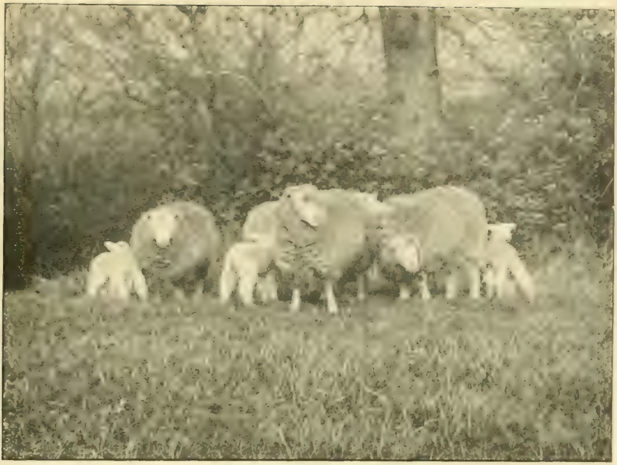
> "The Dishley breed is perhaps the best ever reared for a rich arable district, but the least tincture of this blood is destructive to the mountain sheep, as it makes them incapable of standing the least scarcity of food."

This refers only to stock to be retained for breeding, as marked success has attended the crossing of mountain ewes with Leicesters and other Long-wools, when the progeny goes directly to the fat market, or is supplied with ample food during winter. Some of the defects introduced by the mistakes of the early breeders, such as entirely ignoring the fleece, have been got rid of. Bakewell bred a sheep to meet the **demands of the markets** of the day, which were for excessively fat, large joints, the small lean mutton now in favour being at a discount. His reply to a criticism of it was:—

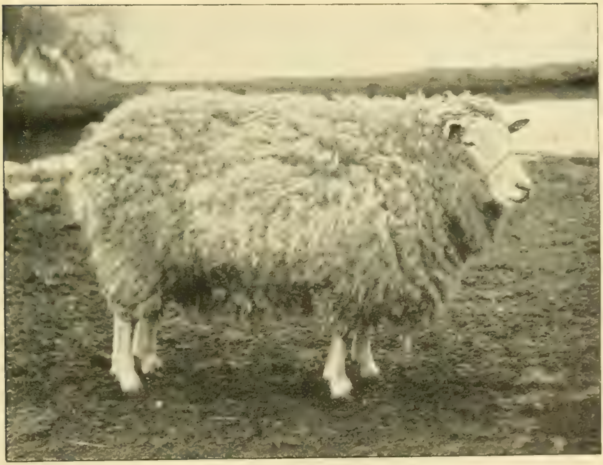
> "I do not breed mutton for gentlemen, but for the public; and even my mutton may be kept leaner to suit every palate by stocking harder in proportion, and by killing the sheep in time."

The once all-pervading *Leicester had to give way* to the competition of other Long-wools which had been improved by its influence, and to the Down breeds, especially the Shropshire.

"The **pure-bred flocks** are now confined to East and North Yorkshire (on the Wolds, in Holderness, and in the vales of York and Pickering), Cheshire, Cumberland, Durham, and Leicestershire."



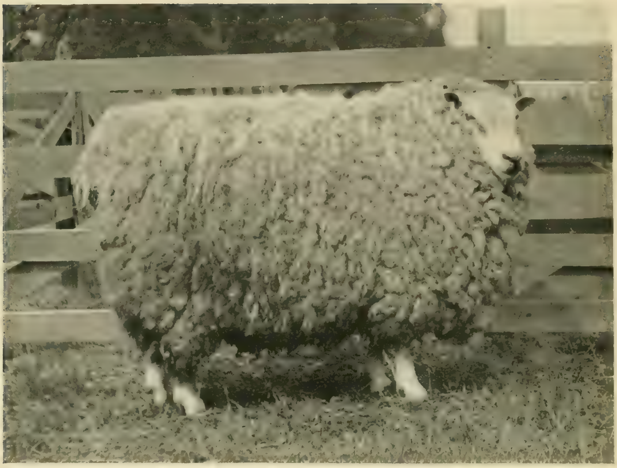
A. ENGLISH LEICESTER EWES AND LAMBS.
Pedigree prize-winners.



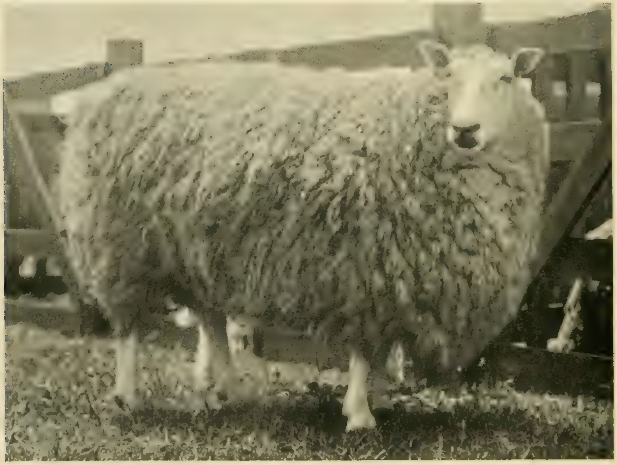
B. ENGLISH LEICESTER EWE (in full fleece).
Both owned by J. E. Ward, Stanthone, Middlewich.

[Photos by G. H. Parsons, Alsager, Cheshire.

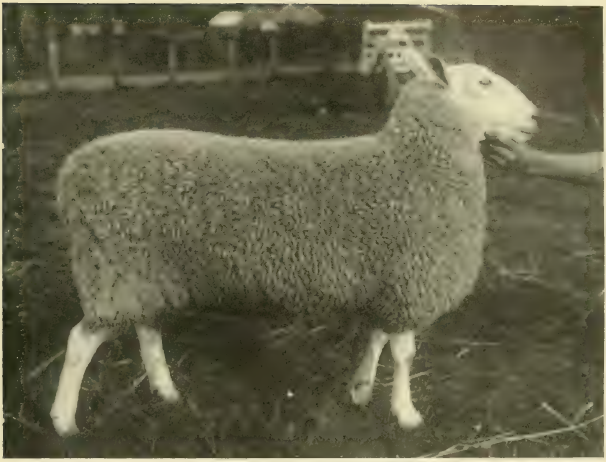
PLATE CLXXXII.



A. English Leicester (4-tooth) Ram.
Champion at Nelson, N.Z., etc., Shows in 1903. From the Wantwood Stud Flock, Wakefield, N.Z.

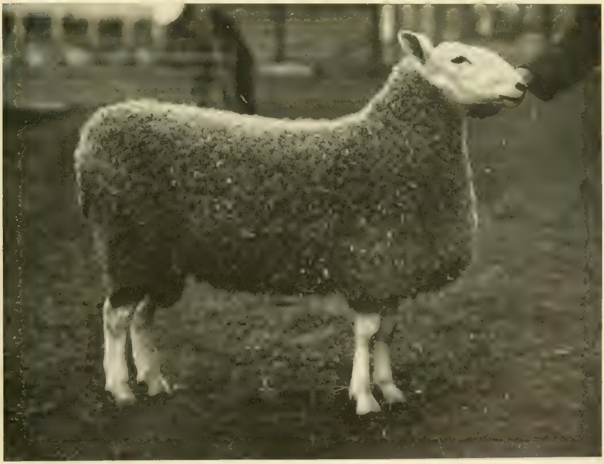


B. Border Leicester Shearling Ewe, "Zealandia."
Sire "Achilles," and G. S. "Agamemnon" (Polwarth breed).
Sire of dam "Moa," bred by Hon. M. Holmes, "Awamoa," N.Z.
Bred by Little Brothers, "Rocklea," Otago, N.Z.



A. Border Leicester Ewe.

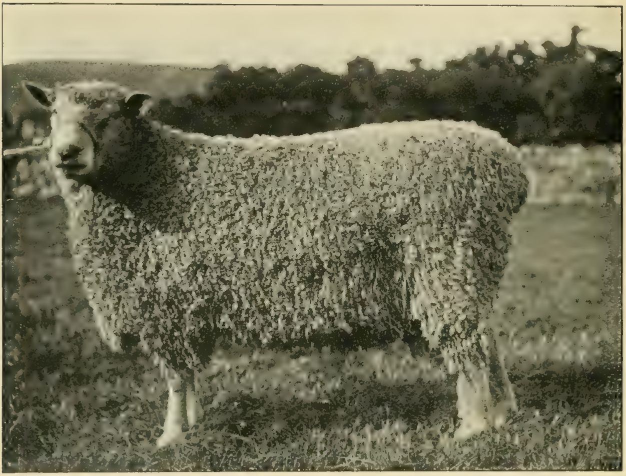
Winner of many prizes, including 1st at the Highland Society's Show in Edinburgh in 1919; she belonged to a noted line of prize winners in the flock of R. G. Murray & Son, Spittal, Biggar.



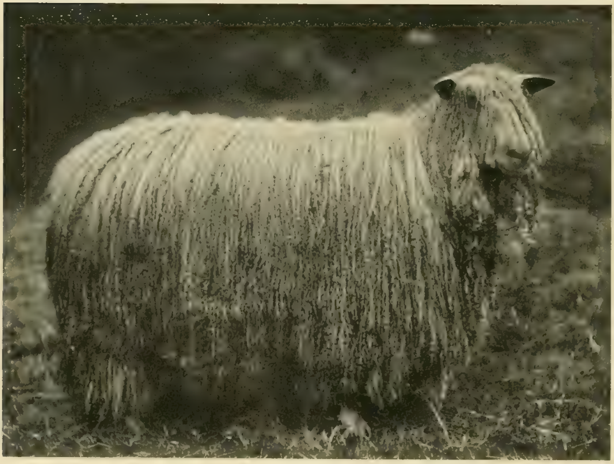
B. Border Leicester Ram.

Gold Medal and Male Champion at Cambridge Royal and Dumfries Highland Show, 1922.

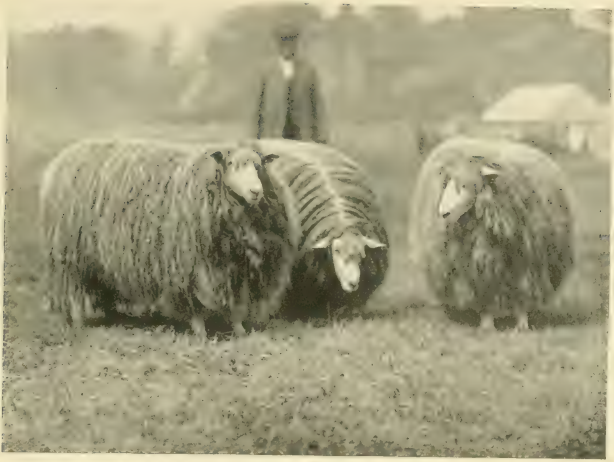
[*"Agricultural Gazette" Photograph.*]



A. WENSLEYDALE (BLUE-HEADED) RAM.
First, R.A.S.E. Show, London, 1904.
Owned by Exrs. of T. Willis, Manor House, Carperby, Aysgarth Station, R.S.O., Yorkshire.

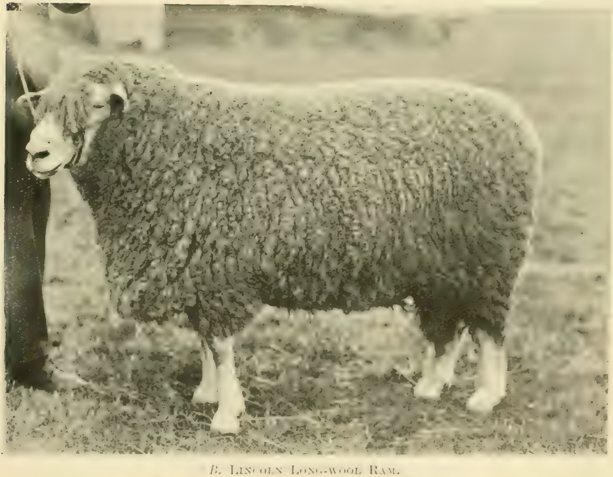


B. WENSLEYDALE EWE HOGG.
First prize, R.A.S.E., Derby, 1921. Bred by Lord Henry Bentinck, M.P.



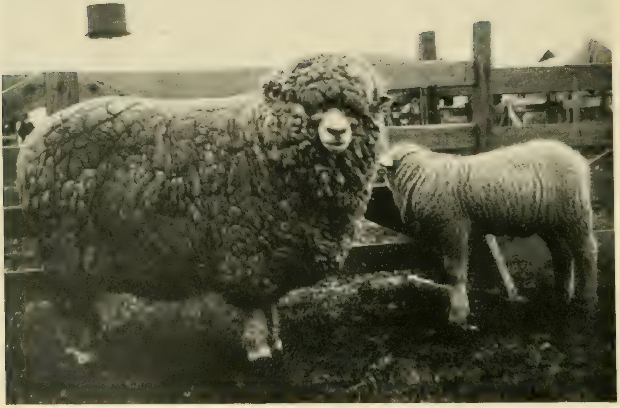
A. LINCOLN LONG-WOOL EWES IN FULL WOOL.
First, R.A.S.E. Show, Park Royal, 1905.

[*J. T. Newman, Berkhampstead.*

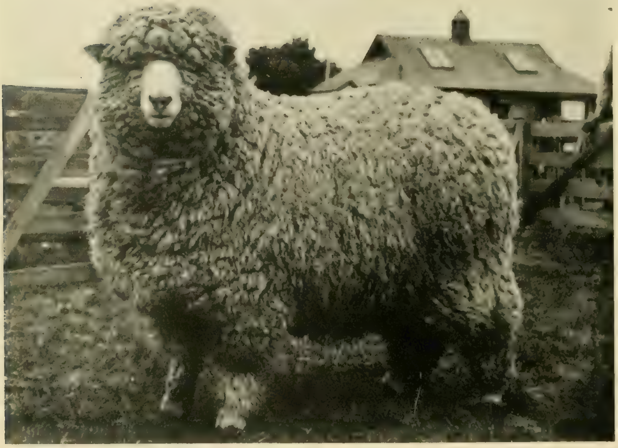


B. LINCOLN LONG-WOOL RAM.
First and Champion Medal. R.A.S.E. Show, Park Royal, 1905.

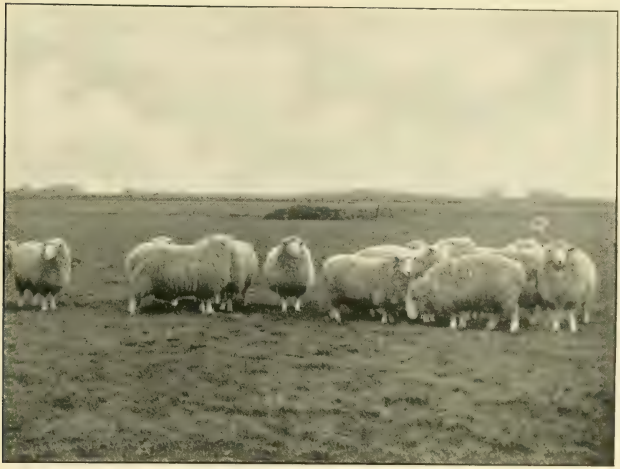
[*J. T. Newman, Berkhampstead.*



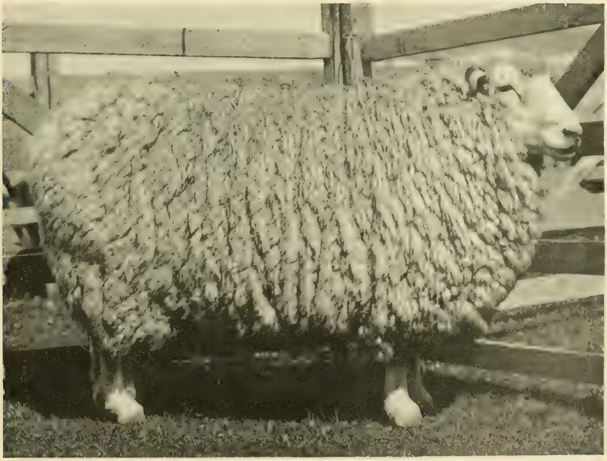
A. Corriedale Ewe.
Champion, Christchurch Show, 1918. From Moeraki.



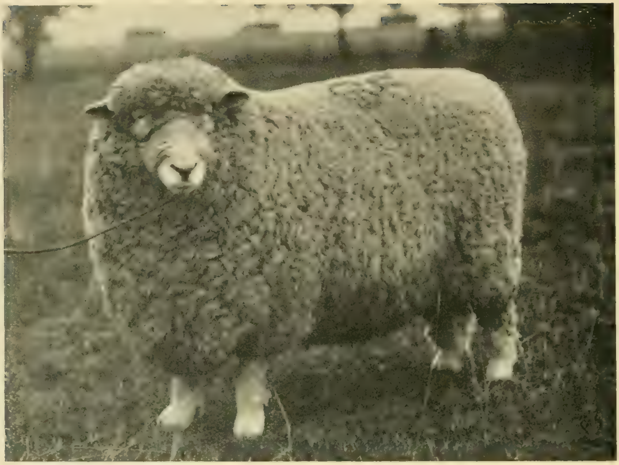
B. Corriedale Ram Hogget.
First and Reserve Champion, Christchurch, N.Z., 1918.



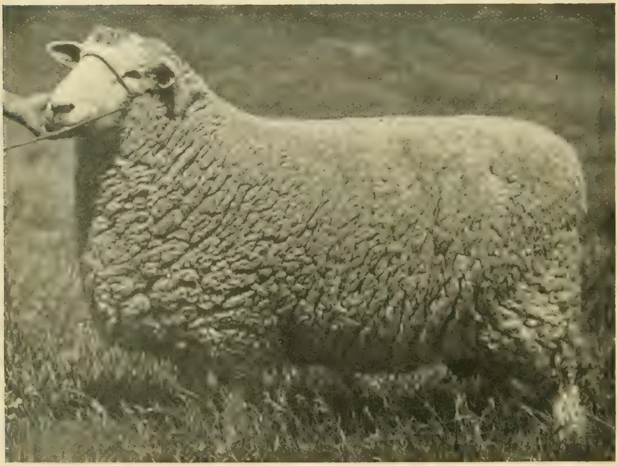
A. Romney Marsh or Kent Ram Lambs.
Owned by A. Lynn, Westhoke House, Lydd, Kent.



B. Romney Marsh Ram, "Glencoe No. 2."
(No. 294 N.Z. Flock Book.) A great Champion winner in 1902-3.
Bred by Herbert S. Hawkins, Glencoe, Waikato, N.Z.



A. ROMNEY MARSH £1000 RAM.
Champion at Ashford, 1918. Exported to the Argentine at £1600.
[*Lambert Weston & Son, Folkestone.*



B. KENT OR ROMNEY MARSH SHEARLING RAM.
Prize-winner, B. & W., 1922. Owned by the Earl of Guildford.

Rams are regularly exported to New Zealand, Australia, South America, and France. They would in most foreign parts have been even a greater success but for the preference given by many breeders to Lincoln sheep mainly on account of their more abundant growth of long, lustrous combing wool; but no sheep surpasses the Leicester in feeding properties, for it can and often does, in a dry season, subsist without artificial food on the barest of wold pastures. *Notes on Leicester Sheep*, by W. A. Brown of Driffield, Secretary of the Leicester Sheep Breeders' Association (formed in 1893), show that "the Leicester as he is now bred has a good proportion of lean flesh," and also that the breed is capable of attaining immense weights of produce in flesh and wool—an aged ram scaling 472 lb. and a shearling 336 lb., and nine gimmers yielding 16 lb. of wool, and forty shearling rams 17 lb. each. The same authority gives the "**points" of the present-day Leicester** as follows:—

"Lips and nostrils black, nose slightly narrow and Roman, but the general form of the face wedge-shaped, and covered with short white hairs; forehead covered with wool; no vestige of horns; ears thin, long, and mobile, and with a blue tinge; a black speck on face and ears not uncommon; a good eye; neck short, and level with back, thick and tapering from skull to shoulders and bosom; breast deep, wide, and prominent; shoulders somewhat upright, and wide over the tops; great thickness from blade to blade, or through the heart; well filled up behind the shoulders, giving a great girth; well sprung ribs, wide loins, level hips, straight and long quarters; tail well set on, good legs of mutton, great depth of carcase, fine bone; a fine curly lustrous fleece (the sheep are well-wooled all over), free from black hairs; with firm flesh, springy pelt, and pink skin. The general form of the carcase is square or rectangular; legs well set on, straight hocks, good pasterns, and neat feet." The typical sheep of this breed is of a mild disposition.

Though the English Leicester may not occupy so large a space in the public eye as other breeds, it is now produced almost equal to the Lincoln breed in the matter of "scale" and bone. Twice in the twentieth century the Leicesters of E. F. Jordan of Eastburn, Driffield, have been awarded the Championship for Long-wools at Smithfield Club Show; and they achieved (in 1915) not only the Championship but also the Blue ribbon of the sheep department, viz., the Challenge Cup given by H.R.H. the Prince of Wales for the best pen of sheep of any breed. This prize pen of three wethers weighed 8 cwts., 1 qr., 24 lb.

Flocks of Leicesters are numerous in New South Wales, New Zealand, and Tasmania. Jordan's prize-winning shearling at the Royal Show at Cardiff (1919) was sold to an Australian pastoralist for 100 guineas. In the U.S.A. it was asserted by some authorities that the Leicester could not stand a severe climate without protection; but a number of the best prize-winning flocks in England are reared on high-wold situations, and near the bleak coast of East Yorkshire, where they are never housed or "pampered."

Professor Marshall of the U.S.A. Department of Agriculture, writing to the Secretary of the English Society, expresses surprise that the Leicester breed is not regularly imported into the States, in spite of a temporary difficulty produced by the fact that the only Leicester Registry Association in that country includes both Border Leicesters and English Leicesters in its records. Another U.S.A. expert—J. J. Ritch of Salt Lake City—says, anyone experimenting in cross-breeding sheep without English Leicesters is "trying to form words without the use of vowels."

New South Wales and New Zealand have each a *Flock Book* of Leicesters, and they reciprocate entries one with another. The flocks of E. F. Jordan of Eastburn, and George Harrison of Gainford (both in Yorkshire), are best known in Australia and New Zealand, and many of the best flocks have their blood.

The late Thomas Smith of Powrie, Forfarshire, Scotland, had a fine flock of Leicesters, which he reluctantly sold off in 1885, partly because he could only get his rams sold for crossing purposes. Some of his hillside friends stuck to the Powrie rams for crossing with Blackface ewes as long as they could get them.

The fairs at which Leicesters are now principally sold are Driffield (the headquarters of the Society), Malton, Market Weighton, Seamer, York, and Hull. Two sales are held annually at Driffield—the first Thursday in August, and 19th September. The general averages at the sales of the last few years have been between £20 and £30 for shearling rams. Female sheep (gimmer shearlings) sold (1919) at £8, 2s. 6d. each in the open market.

The various flocks seen at these sales in 1918 and 1919 were a great improvement on the specimens shown ten or fifteen years before. First and foremost was the great development in size and "style" of the sheep in general, the symmetry of the rams having improved in the leading flocks; there was also a greater wealth of bright lustrous wool, with increased length of staple.

The principal **breeders of English Leicesters** are:—W. A. Coleman, North Burton, Hunmanby; W. A. Cundall, Sherburn, East Riding, Yorks; W. M. Curzon-Herrick, Beau Manor Park, Loughborough, Leicester; Thos. Dale, Callis Wold, Bishop Wilton, York; S. D. Stanley Dodgson, Tarn Bank, Cockermouth; Geo. Harrison, Gainford, Darlington; T. H. Hutchinson, Catterick, Yorks; E. Holtby and R. H. Stocks, Haywold, Middleton, Driffield; Ed. Johnson, The Grange, Full Sutton, York; E. F. Jordan, Eastburn, Driffield; Thos. Leefe, Fryton Hall, Slingsby, Malton; Robt. Megginson, Garton, Driffield; Wm. Megginson, Thirkleby, Malton; Jas. Phizacklea, Tarn Foot, Leice, Ulverston; Mrs Adela C. A.

Shaw, Welburn Manor, Kirbymoorside, Yorks; J. E. and C. H. Simpson, Hunmanby; W. K. Triffitt, Flixton, Scarborough; J. F. Thompson, Riplingham, Little Weighton, Hull; R. W. Ullyott, Gembling, Driffield; C. C. Wray, East Flotmanby, Filey.

If there is in any year a diminished call for fat lambs the Leicesters make the best of "wintering" sheep, and are then ready for the market at such times as the flock owner is in need of ready money, or as the root crop is consumed.

The Agricultural Relief of Allies Committee (of which the Duke of Portland was President) got two model flocks of breeding sheep of 100 each sent out to Northern France in August, and another flock of 52 in October 1919.

The Duke of Portland wrote to Lord Middleton (President of the L.S.B.A.) describing the sheep as magnificent specimens, which, on their arrival in France (Somme area), excited the admiration of all who saw them, and the deepest gratitude to English breeders (and the Committee). In addition to the above, the members of the L.S.B.A. contributed as a free gift 9 shearling rams and 22 gimmer shearlings.

The breed has never been so popular with Yorkshire farmers as it is to-day, and it holds the premier position as a farmer's utility sheep in a wide district which is probably also the best farmed area in England; the membership of the Society has doubled within the past few years.

The Border Leicester was bred at first from Bakewell's Dishley Leicester by crossing with the Cheviot, but it now ranks as a pure breed, and is one of the best and the most popular of the varieties of Leicesters. Matthew and George Culley, who were disciples of Bakewell, introduced his methods into Northumberland when, in 1797, they migrated from the county of Durham to Fenton, near Wooller, taking the new breed with them. Other immediate followers as Leicester breeders were Thompson of Chillingham; Jobson of Chillingham Newtown; Robertson of Ladykirk; Smith of Learmonth; Compton of New Learmonth; Smith of Norham; and Riddell of Templedean.

The following description, here condensed, is quoted from the *Statistical Account of Scotland*, compiled by Sir John Sinclair in 1792-93:—

> "The sheep in general are very good, and are commonly known by the name of the 'New Leicestershire,' first introduced by Bakewell. They are uncommonly good feeders, but often do not carry so much tallow as many other kinds do in proportion to their weight. Culley first introduced the breed twenty years ago, and at present there are eight or nine people in the district between the Cheviot and Lammermoor Hills whose flocks are very highly improved. The sheep formerly in this country, called 'Muggs,' were tender, slow-feeding animals, with wool over most of their faces, but there is hardly an individual of this species [breed] now to be met with in

the neighbourhood. Culley's kind of sheep, on the other hand, have open countenances, without any wool on the face from the ears forward, and are as kindly feeders as the others are slow ones. They are neither long-bodied nor long-legged, but well made, handsome sheep, deep in the chest, and broad at their shoulders, loins, and crops, which last are thrown well back. They are deep and broad of their breasts, which are well seen before ; they stand on well-proportioned, clean, small-boned legs. Culley's flock is almost entirely sprung from Bakewell's, as he wisely perceived that Bakewell was on the right track of breeding long before most people would allow it."

The most recent authoritative account of the breed[1] by James Wood, O.B.E., appears in the *Journal of the Board of Agriculture for Scotland*, October 1921. He points out that the "Northern breeders [of Sinclair's time] continued for many years either to purchase or to hire rams [the price paid for the hire of a ram for the season varying from 50 to 200 guineas] from members of the Bakewell Club, which bought up the Dishley sheep at Bakewell's death in 1795." Mention is made of their being maintained in all the southern counties of Scotland, as far north as Perth, Forfar, and Murray, etc. Wood attempts to claim that flocks of the improvers, generally, like that of Thompson of Bogend (established about 1795, at the time he removed to Mungoswalls, Duns), were kept as pure Dishley Leicesters, with fairly common importations from the south which were kept up to 1830, but abandoned about the middle of the century. *Ergo*, he argues, Border Leicesters are descended in direct line from Bakewell's Dishley Leicesters. In the absence of authoritative evidence there are two very important facts which people holding this view will have difficulty in overcoming, viz., (1) that it was the all but universal custom to use the Dishley Leicesters in the improvement of other breeds all over the country, except in the case of mountain sheep, where nature had fixed an insurmountable barrier, and (2) the strong Cheviot characteristics which really distinguish the Border Leicester from the English Leicester.

At the Shows of the Highland and Agricultural Society, "classes were provided for Leicesters only up to 1868, for both sections from 1869 to 1872, for Border Leicesters only in 1873 and 1874, for both sections from 1875 to 1881, and since that date for Border Leicesters only."

Besides many pure-bred flocks kept for ram breeding in the Border counties and other favoured parts of the country, Border Leicester rams are now used all over Scotland, except on the highest hills, which can only carry pure-bred Cheviot and Blackface sheep. "In England the breed is strongly represented in Northumberland and Cumberland, and to a less extent in Durham, Yorkshire, and Westmorland, while a few isolated flocks are maintained even further south." In Ireland there are 118 registered flocks, many of them owned by small breeders. Overseas, New Zealand is the chief home of the Border Leicester, but many sheep have gone in times of peace during recent years to Australia, South America, South Africa, Canada, and latterly even to Japan.

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[1] An admirable early account of the breed, appearing under the name of James Archibald of Overshields, in the *Highland Society's Transactions* for 1880, was written by his brother, David Archibald, Awa, Otago, New Zealand. (See also *Border Breeds*, etc., John Usher, footnote, p. 588.)

It is noted the world over as a ram-producing breed of outstanding merit. The New South Wales *Farmers' Bulletin*, No. 132, August 1920, reported the results of experiments made to test the relative merits of the Lincoln, the Leicester, and the Border Leicester breeds, when mated with Merino ewes to produce a dual-purpose mutton and wool cross-bred sheep: "the Border Leicester crosses furnished the most suitable class of carcase for export," giving "relatively a greater proportion of dressed mutton to the total live-weight than either of the other two crosses"; the Lincoln crosses yielded the most wool, but the Border Leicester cross-wool was of finer quality; while the total money value was practically the same in both with a mere shade of difference in favour of the Lincoln-cross fleece.

There are some 6000 to 7000 shearling rams sold annually in September at various important centres in Scotland and the North of England, notably at Perth, Aberdeen, Glasgow, Ayr, Carlisle, Rothbury, Edinburgh, and Kelso. The last is the most important centre for the sale, under the auspices of the Border Union Agricultural Society, of the best sheep, and there most breeders find suitable stud rams for their pure-bred flocks (see Table on page 692 for the numbers there sold). Wood estimates that 90 per cent. of the annual output are used for cross-breeding with ewes of other breeds, in which the Cheviot, for several reasons, occupies the first place. This particular mating nicks well, and produces the "half-bred." The wether lambs make first-rate feeding hoggs, and many of the half-bred ewe lambs from flocks known to occupy sound hill land, produce excellent breeding ewes with superior milking qualities, to mate with Border Leicester rams for the production of "three-parts-bred" lambs (which mature rapidly and grow into larger sheep than the half-breds), or with any of the various Downs, which stamp their offspring with superior quality of both mutton and wool. Border Leicester rams also mate well with Scotch Blackface ewes to produce "cross-bred" lambs smaller in size than the "half-breds," but useful for similar purposes, feeding-off or breeding to pure-bred rams of various breeds. Although the Border Leicester is an upstanding sheep (which does not now in height conform to Sinclair's early description), reaching fat weights of from 100 to 200 lb., it is fine-boned and light in the build of its head, and therefore gives little trouble at lambing time when rams are put to ewes of other mountain breeds, or to other sheep with smaller frames, which all produce an excellent early-maturity product. The mating with Dorset Horn ewes has recently proved unexpectedly successful.

The Society of Border Leicester Sheep Breeders was formed in 1898. The first of its annual *Flock Books*, issued in 1899, contained 165 members and 160 registered flocks. The 1921 issue, vol. xxiii., has 470 members and 460 registered flocks.

The mutton of the pure-bred sheep is not of first-rate quality, being somewhat coarse in the grain and tallowy in the fat.

Special Points.

1. The *head* well carried, long, broad between the eyes but not high on the crown, nor too heavy behind the ears; the two latter characteristics if developed in the male involving difficulty in lambing in this as well as in other breeds. 2. The *profile* slightly aquiline, tapering to the muzzle. 3. The *muzzle* large, open, and black, with wide nostrils. 4. The *hair* on the face and legs uniformly white and hard (but not so wiry as in the case of the Cheviot), and extending well back behind the ears, free from any trace of wool. 5. The *ears* not too large nor drooping, and white inside and out; black *spots* appear sometimes, especially with age. 6. The *ribs* well sprung in a fine circular arch, more noted for width than depth, and "carrying the mutton high." 7. The *belly* "light," said to "carry little offal," and giving a leggy or high-standing appearance when the animal is shorn. 8. The *wool* long, soft, and in little locks or *pirls*, but not too open: especially on the ribs, it should fill the hand. 9. *Fat tegs*, at twelve to fourteen months old, *weigh* 23 to 25 lb. per quarter, but many are fed-off at an earlier date at lighter weights to suit the market.

Brief Calendar of Events in a Border Leicester flock:—

1*st January*.—Ewes begin to get a little better treatment—either a little concentrated food in boxes, or a limited quantity of swedes. 1*st March*.—Ewes begin to lamb. *April*.—Pedigree Border Leicester lambs are tattooed on the bare skin, inside the ear, with flock marks. *May*.—Border Leicester hoggs are clipped. 1*st June*.—Border Leicester ewes are clipped. 1*st July*.—Border Leicester lambs may be "speaned" or weaned at any time in July—the sooner the better on suitable pasture. 20*th July*.—Border Leicester stock ewe lambs are "speaned." 1*st October*.—The tups are put to the ewes. 28*th November to* 10*th December*.—Hoggs put on to turnips where grass fields have failed.

The **chief difficulties** of a shepherd in charge of Border Leicesters are—when they suffer from lameness, from maggots, or from being broken on the crown by flies; hoose in lambs; and keeping thin hoggs (especially tups) dry in winter, to prevent their legs twisting.

The following are a few names of **important breeders** from a list of over 480:—The Right Hon. Earl of Balfour, of Whittingehame, Prestonkirk; James Butters, Masterton, Dunfermline; R. and W. R. Dickinson, Longcroft, Oxton, Berwickshire; Alex. Findlay, Mill of Marcus, Forfar; James Jeffrey, Deuchrie, Prestonkirk; John Kinnaird, Newmains, Stenton, Prestonkirk; W. Gilchrist Macbeth, Dunira, Comrie; John Mark, Sunnyside, Prestonkirk; Andrew M. Montgomery, Nether Hall, Castle Douglas; R. G. Murray & Son, Spittal, Biggar; Alex. Niven, Ayton, Newburgh, Fife; W. Alexander Ronald, East Cevidley, Keig, Whitehouse, Aberdeenshire; Wm. R. Ross, Milton of Culloden, Allanfearn Station, Inverness; T. and M. Templeton, Sandyknowe, Kelso; D. and W. Wallace, Auchenbrain, Mauchline.

The Earl of Balfour, A. M. Montgomery, R. G. Murray & Son, A. Niven, and W. R. Ross are successful exhibitors at shows. R. and W. R. Dickinson won the Female Championship, and W. G. Macbeth the supreme Championship, at the Stirling Highland Show in 1921; the latter exhibiting for the first time, as his flock had been founded in 1920, from the Nisbet Hill (Elliot) and Ardargie (M'Intosh) dispersals. Alex. Findlay, Mill of Marcus, sold by auction at Kelso in 1920, the highest priced Border Leicester ram at £1100 to Archibald Cameron & Sons, Westside, Brechin; while John Kinnaird comes next with £600 in 1919 to Wm. R. Ross, Milton of Culloden. R. G. Murray & Son, Spittal, whose showyard record is famous, exported in 1921 17 sheep (2 rams and 15 gimmers) to Japan—the first export of Border Leicesters to that country. Wm. Robson, Low Hedgeley, sold the highest priced ram at Kelso in 1921 for £380 and he proved a successful prize-winner.

The Wensleydale is a large, high-standing, long-sided, firm-fleshed Yorkshire-Leicester breed, with a characteristic deep blue colour in the skin of the face, legs, and ears, which sometimes extends to the whole of the body, though the shade is darker on the bare or hairy parts. The dark colour is cultivated, because in the extensive use of the rams in crossing with the Scotch Blackface breed it is found that dark blue rams throw dark grey-faced lambs.

The lambs bred in this way are termed "Yorkshire crosses" in Scotland, where they are extensively kept for "hogging." In the east of Yorkshire and in Lincolnshire, where many thousands of them are annually bought for breeding to early-maturity rams, and for fattening during winter, they go by the name of "Mashams," from the market where they are sold.

Special Points.

Bright and lustrous wool of open character, of good length, and divided into uniform little knots or "pirls," should cover nearly the whole surface of the body, and be free from mistiness on the back. A fine tuft should cover the forehead between the eyes, and finely pirled wool the back of the head, round the ears, the back of the hind legs down to the hoofs, and at times even the fore legs. The belly and scrotum should also be covered. Hairy wool on the thighs, where the coarsest wool tends to grow, is objectionable.

Quality of Wool.—Pure Wensleydale wool won the British Wool Merchants Gold Cup at the Great Yorkshire Show at Leeds in 1921 against all the other Long-wools. In **South Africa** the Wensleydale-Merino cross wool makes higher prices than any other similar cross.

The head is of good size, the nose wide, and in the rams strong and slightly arched, terminating with a strong muzzle, and gaily carried on a long and strong neck well set on the shoulders, giving much greater style of carriage to the breed than is usual with other English Long-wools; the back of the head flat, and the ears large, but well set on and well carried; hair is entirely absent about the forehead, the back of the head, and the ears; and there is no coarse hair on the rest of the face.

The sheep of Upper Wensleydale, early in the eighteenth century, were the Blackface horned breed; and in Lower Wensleydale the Whiteface horned breed, of the mountains of the North-West of England; and to this day, in some places, the modern representatives of these breeds are known locally as Wensleydales. The last of the Whiteface horned sheep disappeared from Wensleydale more than one hundred years ago, and all the available evidence indicates that they were replaced by a branch of the improved Teeswater breed. **The original breed** was, according to Youatt, "probably from the same stock as the Old Lincolnshires, a tall, clumsy animal, polled, and with white face and legs, but with characteristic black spots on the face and ears"; of slow maturity; yielding a very heavy carcase of fine-grained meat. The wool was "remarkably long and coarse, but thinly set on the skin," and the "ewes were exceedingly prolific." The breed was "among the first to experience the beneficial effects of a cross with the Dishley sheep—a somewhat kindred breed, but possessing very good points in which the others were manifestly deficient." The cross resulted in "very considerable diminution of size; the carcase was rounder and more compact," and came to maturity earlier. "The Leicester mutton was not so delicately flavoured as the Teeswater," and yet the result of the cross was, "that the flesh of the Teeswater was evidently improved. The staple of the fleece was shortened, but the wool was finer and closer," and a greater amount was produced.

It is believed that the **improved variety**, under the name of "Mugs," began to be **introduced** about the middle of the eighteenth century; and Wensleydale became in due time the chief home of the breed, which, like many other old-fashioned forms of Long-wool sheep, was driven out of its original habitat by the more rapid-maturity improved Leicester.

An officially acknowledged **description of the "Mugs"** before 1840 has been given on the authority of "an old breeder" as follows:—"They were of large size, standing high on the leg, of a good length, and with particularly good strong loins and legs of mutton. Their great defect was behind the shoulder, and a want of thickness through the heart, while their necks were long and weak. The wool was nicely curled and of good quality, and the head and ears white, with black spots."

It is not definitely known to what extent and at what time before 1839 improved Leicester rams were used to change the original Teeswater sheep into the one just described. But a very famous ram, Richard Outhwaite's "Bluecap," a half-bred Leicester, born in that year, exercised a most important and far-reaching influence on the breed. Sired by "an elder Bluecap, bred by the famous Leicester breeder Sonley, of Lund Court, near Kirby Moorside," he was a "very big Leicester" which cost 40 guineas for one year's service, put to ewes that had for several years been bred from "a very grand Teeswater tup." Outhwaite's "Bluecap" . . . "had a very dark blue head, and his skin was nearly black, although covered with fine, white, lustrous wool."

The practice of letting rams for the season led to the wholesale distribution of "Bluecap's" blood through his numerous three-parts-bred sons, who seemed to have nicked remarkably well with the ewes of the leading breeders of the time, a result clearly attributable to the previous judicious introduction of Dishley-Leicester blood. Under the influence of this cross the "sheep began to be stronger in the fore-rib, shoulder, and neck"; and "a race of sheep was produced combining the hardiness, activity, and lean flesh of the Teeswater, with the symmetry and early maturity of the improved Leicester." By 1860 the leading flocks had assumed a uniform type.

The **special properties** claimed for the improved breed are:—"That they are good breeders, excellent mothers, good feeders, have a good leg of mutton, and a class of wool that makes a higher price than any other Leicester wool. The ewes frequently produce 70 to 80 per cent. of twins."

The breed was introduced into Scotland as far back as 1814 by Thomas MacQueen, of Crofts and Muil, in Kirkcudbright, to cross with Blackface mountain sheep on the heathery hills of the Southern Highlands. There they have maintained their ground, in virtue of being the hardiest and most active of the Leicesters, although on some of the grassy green hills and better classes of lowland pasture, good enough to develop the bone of the Border Leicester, the latter (owing to a greater tendency to early maturity and fat-production) has supplanted it. Cross hoggs are particularly well suited for feeding-off in spring, producing mutton of prime quality.

Cross-breeding Successes.—Wensleydale rams have proved to be the best sires in the Leeds University Trials, against all the other crossing breeds. Championship at Penrith Christmas Fat Show has been won by Wensleydale cross Blackface wethers for the past thirteen years. The Wensleydale Romney Marsh cross is most successful in Kent.

It is claimed for the Wensleydale ram "that he is large and strong-boned, with great length of side and more lean flesh than any other long-wooled breed," and that "no other breed of rams can compare with the Wensleydale for getting "cross-breds" for breeding. The cross-bred progeny of Wensleydales are likely to grow in favour as heavy fat sheep become more and more unpopular.

The **name of Wensleydale Long-wool** was given in 1876—in preference to the time-honoured local name of "Mug," and to that of "Yorkshire-Leicesters" by which they were known, and are at times still called, in Scotland—to overcome the difficulty of finding a proper designation for them in the show catalogue, when the Yorkshire Agricultural Society first offered prizes for the breed.

In May 1899, vol. i. of their *Flock Book* was published by the "Wensleydale Long-wool Sheep Breeders' Association and Flock Book Society," with an appended list of 125 members, including 104 breeders. In September of the same year, the first volume of the *Flock Book*, compiled by the "Pure Select Wensleydale Sheep Breeders' Association and Flock Book Society," was issued with a list of 45 members, 33 being breeders. The relative positions of the two Societies had materially changed within fifteen years, for in 1905 the latter, or "Blueface," Society had a membership of 100, 78 being breeders; and the former, the original Society, 70 members, including 50 breeders. The Societies were amalgamated in 1920 as the **Wensleydale Long-wool Sheep Breeders' Association**, on the agreement of the old Long-wool Society to accept all the conditions respecting pedigrees of sheep previously laid down by the "Blueface" Society. For some years previously the old Society had drawn extensively from the "Blueface" *Flock Book* for new blood, so the union involved no introduction of outside blood. Till the end of 1921 the *Flock Books* issued numbered 32, the registered flocks 170, and number of members 205.

The most Prominent Breeders are:—John Allison, Howgrave Hall, Bedale; Lord Henry Bentinck, Underley Hall, Kirkby Lonsdale, Westmorland; C. Butler, Red Court, Carnforth; Richard Chester, Low Moor Farm, Ripon, Yorks; T. E. Clarke, Challan Hall, Silverdale; W. L. Clarkson, Lundholme, Ingleton, Yorks; Wm. Dinsdale, Low Bolton, Redmire, Leyburn; F. Foster, Clapham Lodge, Bedale; John William Greensit, J.P., Holme-on-Swale, Thirsk, Yorks; John Hargrave, Wath, Ripon; John Hoggarth, Manor House, Slyne, Lancaster; R. H. Milner, Borwick Lodge, Carnforth; Wm. Milner, Slyne Hall, Lancaster; John Percival, East End House, Carperby; Joseph Thompson, Shotterton Hall, Winston, Darlington; John A. Willis, Manor House, Carperby, Yorks. *Hon. Secretary*, G. Goland Robinson, Underley Farm, Kirkby Lonsdale, Westmorland.

The Association holds two annual **ram shows and sales**, the first at Hellifield on the first Tuesday of October, and the second at Northallerton the day after. These are recognised centres for the purchase of good rams for pure breeding as well as for crossing purposes, Hellifield Sale being especially favoured by Scotch buyers. In 1921 prizes to the amount of £32, 10s. were given by the Breed Society at these shows. A sum of £56, 14s. was also provided towards the prizes for Wensleydale sheep at the principal agricultural shows in the Society's district, as well as those of the Royal Agricultural Society, the Great Yorkshire, and the Royal Lancashire.

Characteristic Features.—The breed is specially noted for the absence of patchiness or excess of fat. The crosses bred from it are slower in coming to maturity than those of the Border Leicester or the other breeds of long-wooled sheep. The superior quality of flesh produced, and the hardy constitution and active disposition, enable it, however, to maintain the position of first favourite in many districts; though it must be admitted that in some counties, such as Dumfriesshire, Border Leicester rams have displaced the Wensleydale in breeding half-bred lambs by Cheviot ewes, and to some extent in breeding crosses by Blackface ewes.

Since the issue of the last edition of this work in 1907, considerable progress has been made in the development of early maturity. The measure of success may be judged by the fact that the Champion Suffolk flock-owner in Ireland founded in 1921 a first class Wensleydale flock, and he maintains that the Wensleydale is the "Suffolk" of the Long-wools.

No effort is being spared by progressive breeders to improve the carcase points.

The Lincoln Long-wool is the largest sheep in England, though not taller than the Cotswold or South Devon. It was produced by crossing the Old Lincoln, which was famous for its wool, with the English Leicester.

Professor Low, in *Domesticated Animals of the British Isles*, classes the Lincoln with the Romney Marsh as "Long-wooled sheep of the fens and alluvial country," in contradistinction to the long-wooled sheep of the plains, such as the Leicester and Teeswater breeds. He writes of the Old Lincoln as "of large size and coarse form; and describes the wool as long, thick, and tough in the filaments, of inferior felting properties, but tolerably soft to the touch, and rarely approaching to the harsh and wiry character of hair," unsuitable for carding, and never prepared except by combing for worsted yarn. "The fleeces weigh from 10 to 12 lb., and those of rams and fat wethers often greatly exceed that weight. The sheep fatten slowly, and consume much food, but are valued by the butchers for their tendency to produce internal fat." Such was the animal that by frequent crossing with the improved Dishley Leicester was after many years transformed into the present-day Lincoln. It is said to have been reduced in size, and its aptitude to fatten and tendency to early maturity increased, "while the wool is shorter and finer, though it wants the toughness, softness, and length of fibre of the true Old Lincoln breed," the wool of which was "altogether peculiar and such as no other country in Europe produced." Low deplores the fact that refinement was introduced by crossing, rather than by applying Bakewell's methods within the breed itself. Probably many of the disadvantages proceeding from crossing have since been eliminated by selection, as there is no long-wool breed in the country which can produce anything like the same quantity or high quality of long, strong, lustrous wool as the Lincoln.

LINCOLN RAM: SCALE OF POINTS UP TO DATE.

	Points.
Good Symmetry. Shoulders well back with head up .	10
Size. A Lincoln is essentially a big sheep, not leggy .	10
Length and Girth. Good length; deep ribs wide sprung .	10
Head and Ears. A masculine head with deep wrinkles on forehead, a clear bold eye, wide nostrils, blue skin, not pink; ears long, well placed, not pointed too forward or "lopping," white objectionable, blue-grey in colour, mingled with darker spots	10
Bone. Strong to carry weight and substance . .	10
Activity. Walk free and gay	10
Mutton. Deep, firm flesh along the back, a wide loin, no hardness of touch on top of shoulder, a good wide "scrag," leg of mutton let well down	20
Fleece, very important. Great weight of wool without coarseness; a broad clean staple of fine lustre, with a wavy appearance in the lock; soft, "mossy" wool objectionable; no harsh straight hairy wool on thighs; breast and inside the thighs covered; head well covered; forelock broad	20
Total . . .	100

The staple[1] of well-bred tegs should be about as broad as two of a man's fingers. It is its power of wool-production and great size which have brought it into high repute in sheep-rearing countries abroad, although it is admitted that the mutton is only of second-rate quality.

The **export record** of the breed during 1906[2] beat all previous records of the Lincoln or any other breed in this country. For the year ending 30th September 1906, certificates were issued by the Lincoln Long-wool Sheep Breeders' Association for 3674 rams, 1614 shearling ewes, 339 ram lambs, and 333 ewe lambs; or a total of 5960,[3] an increase of 1758 over the previous year's total. Another important incident in the history of Lincoln sheep was the sale (in 1906) of the entire flock (950 animals) of Robert and William Wright, of Nocton Heath, Lincoln, through F. Miller, of Birkenhead, to Señor Manuel Cobo, of Buenos Aires, for, it is believed, the sum of £30,000. The flock was founded in 1790, and it had been one of the most prominent flocks, winning prizes at shows and bringing high prices for rams for export. As the **Board of Agriculture Returns** for June 1906 showed a total of 993,983 sheep in Lincolnshire, or an increase of 10,146 over the figures of the previous year, the breed is too largely represented in this country to suffer materially from this loss. The same purchaser secured the Royal Champion Shearling Lincoln ram, "Riby Derby Champion," for the **record price** of 1450 guineas, at Henry Dudding's dispersal sale. The prices paid at that sale showed, long before the war upset the equilibrium of prices, the value attached to the best Lincoln blood when offered by public auction. Fifty-six rams averaged £151, 1s. 9d., and 23 ewes £16, 17s. 4d., or a total of £8848, 17s. 6d. for 79 sheep. The activity of the demand was indicated by there being no entries for the sale, usually held in August, by the Lincoln Sheep Breeders' Association.

The prevalence of foot-and-mouth disease was the means of stopping most of the exportations of Lincoln sheep in 1911. Only 325 rams and ram lambs and 81 ewes and ewe lambs were exported; the previous exportations being 593 rams and 160 ewes in 1910, 1225 rams and 249 ewes in 1909, 1568 animals in 1908, 3556 in 1907. Although the closing of the ports again affected the trade in the latter part of the year 1913, the number exported was 647 ewes and ewe lambs, and 2195 rams and ram lambs sent to North and South

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[1] The word "staple" here refers to the natural locks, consisting of many fibres of wool arranged naturally in bundles, but it is also sometimes wrongly used with reference to a single fibre.

[2] See the *Live Stock Journal Almanac* for 1907.

[3] Subsequently reported by the Association to be 6928 in all.

America, Russia, Spain, Holland, New Zealand, and Australia. During 1912 disease was so prevalent at the show season that shows were not held, or prizes awarded.

In 1915, 93 ewes and 1939 rams were exported to North and South America, Australia, and Spain; in 1916, 155 ewes and 2029 rams went to North and South America, Australia, and Canada; in 1917, 233 ewes and 2194 rams to North and South America, Australia, and Canada; in 1918, 25 ewes and 2018 rams to the same destinations; in 1919, 99 ewes and 1748 rams, to the same countries, as well as Holland; in 1920, exports, including those to Spain, were 109 ewes and 1120 rams.

Ram Sale Averages.

		£	S.	D.		£	S.	D.
1906—374	Rams realised	7,580	9	6	Average	20	5	4
1907—360	,,	5,257	16	10	,,	15	0	5
1908—315	,,	3,486	0	0	,,	11	1	0
1909—293	,,	3,800	5	6	,,	12	19	4½
1910—262	,,	2,921	2	0	,,	11	3	0
1911—173	,,	1,664	10	0	,,	9	12	5
1912—116	,,	1,151	6	6	,,	9	18	6
1913—216	,,	2,713	14	6	,,	12	11	3
1914—139	,,	1,654	0	0	,,	11	18	0
1915—169	,,	4,363	16	0	,,	25	16	5
1916—192	,,	5,369	3	6	,,	27	19	3
1917—325	,,	7,454	8	6	,,	22	18	8
1918—386	,,	13,003	14	6	,,	33	13	9
1919—363	,,	13,903	1	0	,,	38	6	0
1920—313	,,	12,903	9	0	,,	41	4	6*
1921—162	,,	3,889	4	0	,,	24	0	1½
1922—213	,,	4,867	11	0	,,	22	16	7

* In 1920 the highest priced ram was 1000 guineas.

Among **prominent breeders** are:—Joseph Brocklebank, Carlton-le-Moorland, Newark; A. W. Dean, Dowsby Hall, Bourne; J. H. Dean, Heath House, Nocton, Lincoln; Robert Fisher, Leconfield, Beverley; A. B. Holt, Sturton, Brigg; C. E. Howard, Nocton Rise, Lincoln; George Marris, Kirmington, Brocklesby; Clifford Nicholson, Horkstow Manor, Barton-on-Humber; A. T. Pears, Mere, Lincoln; W. H. Rawnsley, Well Vale, Alford; J. M. Strickland, Bainesse, Catterick, Yorks; C. W. Tindall, Park House, Louth; G. and H. Ward, Quarrington, Sleaford; W. H. Watson, Temple Bruer, Lincoln; R. and W. Wright, Beckfield, Heighington, Durham.

The Lincoln-Merino "Corriedale" breed was started in 1888 by J. Stringfellow, of Chertsey, Canterbury, New Zealand, by mating Lincoln stud rams with stud Merino ewes, and by subsequent selection to prevent them going too much to the Merino side, as then they become less robust. "The sheep has a great constitution, and with a few exceptions a really good fleece of superfine combing or fine combing wool." The flock took over 200 first prizes at four shows in seventeen years, and there is a ready sale for rams for use at home and abroad at good prices. The breed is now in high favour in Argentina and U.S.A. (See Appendix R.)

The Kent, or **Romney Marsh**, is a hardy, active breed, named from a bleak, wind-swept, but rich alluvial area of 20 square miles in extent, described by A. D. Bright in the article "The Romney Marsh and its Flocks," in the *Nineteenth Century* for March 1921. The origin of the breed is unknown, but "towards the end of the eighteenth century sheep were thriving on the marshes—inelegant creatures, unwieldy and leggy to a degree." It was somewhat modified and improved by crossing with the Leicester one hundred and twenty years ago; but it was early discovered that improvement for a breed like the Lincoln, where abundance of food could be provided by arable cultivation, was no improvement when gained at the cost of hardiness in the case of a sheep which had, like the Romney Marsh, to find its winter food in unsheltered pastures. The breeders, taking their type from the symmetrical Leicester, preferred to accomplish improvement by careful selection of the best to breed from, and no doubt the exceptional hardiness of the Romney sheep and its adaptability to different conditions abroad, are largely due to this fact. Kent sheep are not as a rule even now artificially fed in winter when on natural pasture, and, like the Scotch mountain breeds undergoing similar treatment, they do not lamb till April. A lamb and a quarter to the ewe is under such circumstances a satisfactory yield. For crossing purposes the breed has no superior. The wool, which belongs to the demi-lustre type, is good and in high favour in America, and the breed is one of the closest coated of the longwools.

The **official description** (edited) is as follows:—

> "Head wide, level between ears, with good thick fore-top, no horns or dark hair on the poll, which should be well covered with wool; eyes large, bright, and prominent; face full in ewes, and in rams broad and masculine in appearance; nose invariably black; neck well set in at the shoulders, strong and thick, and not too long; shoulders wide, well put in, and level with the back; chest wide and deep; back straight, with wide and flat loin; rump wide, long and well turned; tail set in almost level with the chine; thighs well let down and developed; the fleece free from kemp, of even texture, and of a good decided staple all over; the face white, and the skin of a clean pink colour."

The best sheep are compact and symmetrical in form, and noted for great breadth of forehead and strength of bone. They are well wooled down, and much more uniform in type than formerly.

They fatten very rapidly, and the early characteristic of being hard to the touch with prominence along the top of the shoulder and back bone, is already distinctly modified.

The flesh ranks next to Down mutton in quality, possessing, in comparison with Lincoln mutton, a much greater proportion of red meat to fat. The breed has been in high favour for many years in the North Island of New Zealand, where much of the pasture-land is steep, and where a lighter and more active sheep is wanted than the Lincoln or the Leicester.

In recent years its merits have become appreciated in Argentina and in several of the other sheep-breeding South American republics, notably in Chili, the Falkland Islands, and Patagonia. The numbers of rams, and latterly ewes, exported to these and other foreign parts, including Canada and South Africa, have steadily increased since the foundation of the Kent or Romney Marsh Sheep Breeders' Association in 1895, and the compilation of the *Flock Book*, of which the twenty-eighth volume appeared in 1922, containing a list of 155 members of the Association; "but many flock-owners kept pedigree records from a much earlier date, and some flocks trace back in direct succession for more than one hundred and fifty years." This progressive movement has led to the extension of the area occupied by the breed in this country. Registered flocks are now established in Hants, Sussex, Lincs, Yorks, and Scotland, which supply home evidence of the well-known adaptability of the breed abroad to different conditions of soil and of management. So stringent are the **regulations for entry** in the *Flock Book* laid down by bye-laws, that

> "no flock shall be eligible for acceptance for entry unless its owner is a member of the Association. Every new flock must be entirely composed of entered sheep, duly trade-marked before leaving their breeder's hands, and must comprise not fewer than forty ewes. Only registered and individually entered rams must be used.
>
> *N.B.*—Flocks accepted for qualification on or before February 7th, 1921, to be admitted so soon as they become eligible under the regulations then in force.

A detailed annual list of winning sheep at shows, and their owners, is likewise included. During the thirties and early forties of last century much interest was taken in **grazing contests**, which were held in different districts of the Romney Marsh, under the management of local committees. The sheep entered for competition were removed from the control of the owners to selected grazings, and no artificial food or fodder was supplied. Judgment was given at the expiry of the allotted period, and prizes awarded to the most useful sheep.[1]

Some Flock-Owners and Breeders (1922).—H. B. Amos, Ripton Farm, Ashford, Kent; Sir H. E. Dering, Bart., Surrenden Dering, Ashford, Kent;

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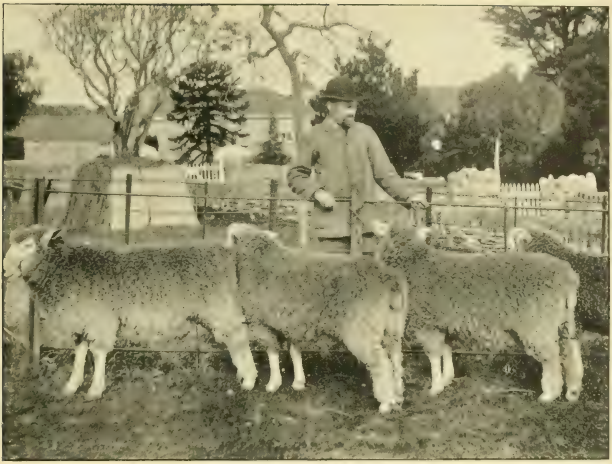
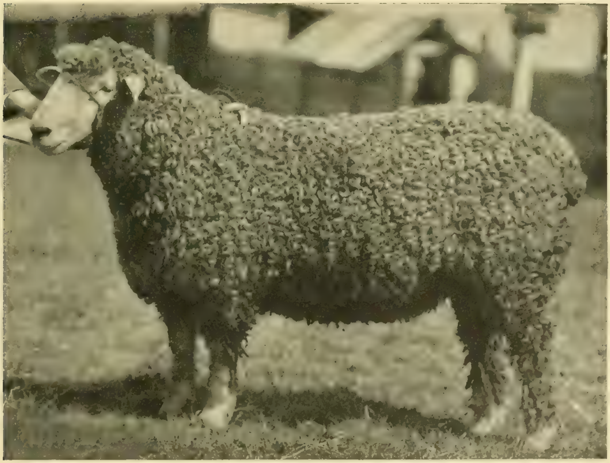
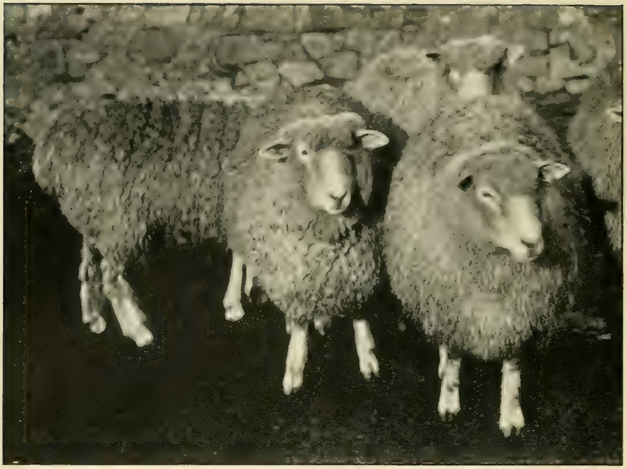
[1] *Kent County Examiner and Ashford Chronicle*, 27th September 1895.



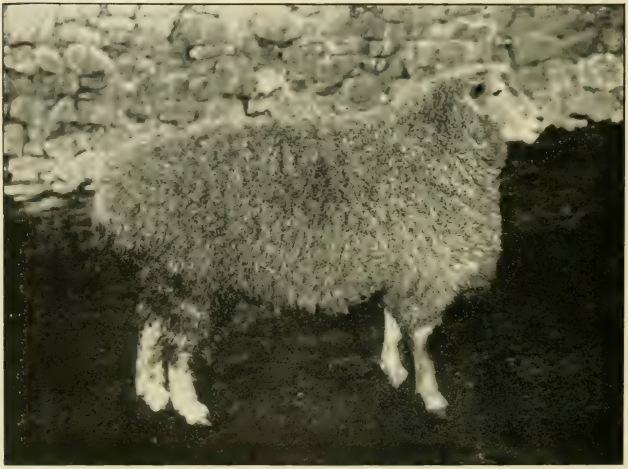
A. South Devon Yearling Ewes.
Winners of several prizes.



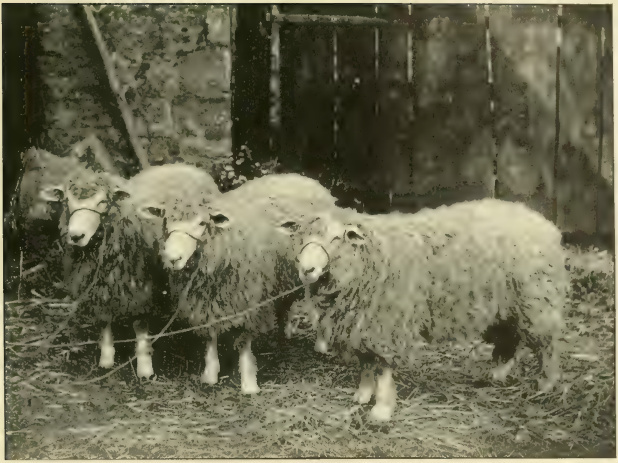
B. South Devon Shearling Ram.
First and Reserve Champion at Bath and West Show, 1922. Owned by P. G. Brown, Cornwall.
[*"Agricultural Gazette Photograph."*



A. Devon Long-wool Ewes (a pen of five).
First, B. & W., and the Royal, and Champion at New Quay, in 1888.

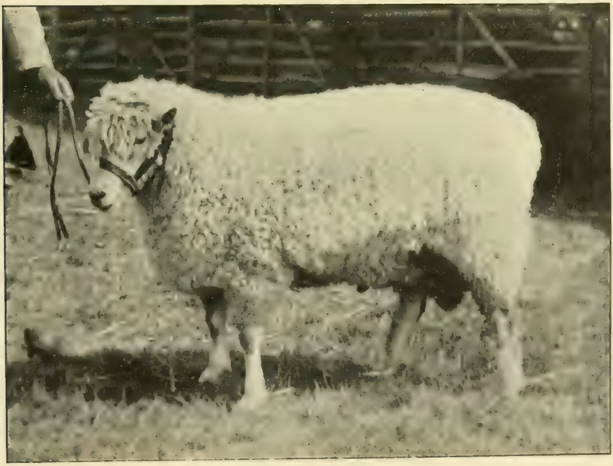


B. Devon Long-wool Two-shear Ram.
First, R.A.S.E., Nottingham, in 1888.
Both the property of Sir J. H. H. Amory, Bart., of Knightshayes, Devon.



A. Devon Long-wool Ram Lambs.

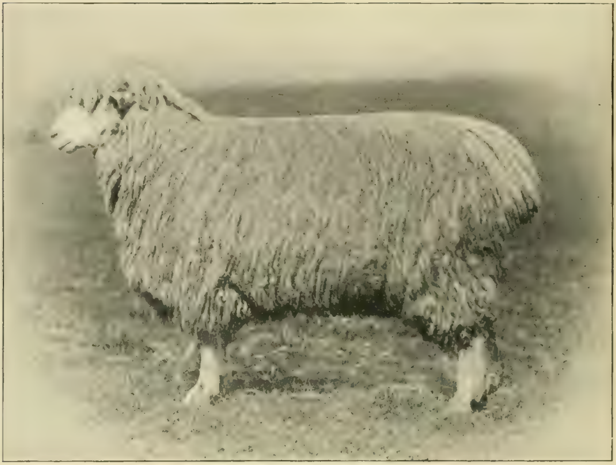
Winners of many prizes, that clipped 8 lb. of wool each at 4 months—4 to 6 lb. being no unusual yield for Ewe Lambs. Owned by Gordon C. Skinner, Pound, Bishop's Lydeard.



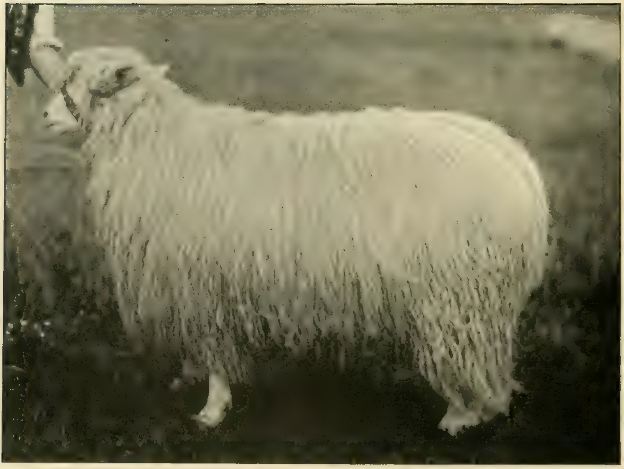
B. Cotswold Shearling Ram.

First prize, Gloucester Show, 1904. Owned by William T. Garne.

[*E. Debenham, Gloucester.*

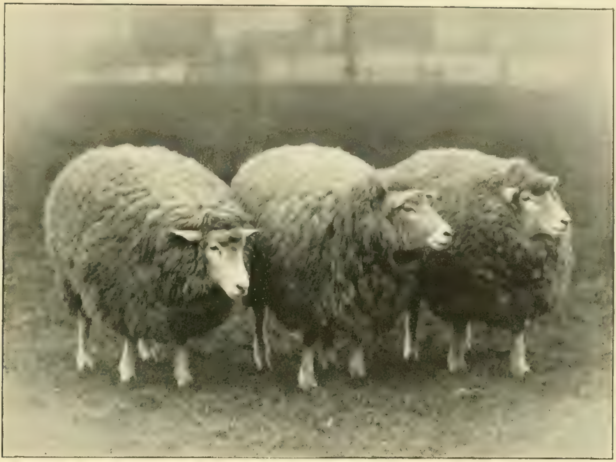


A. Cotswold Ram Teg (with a grey nose).

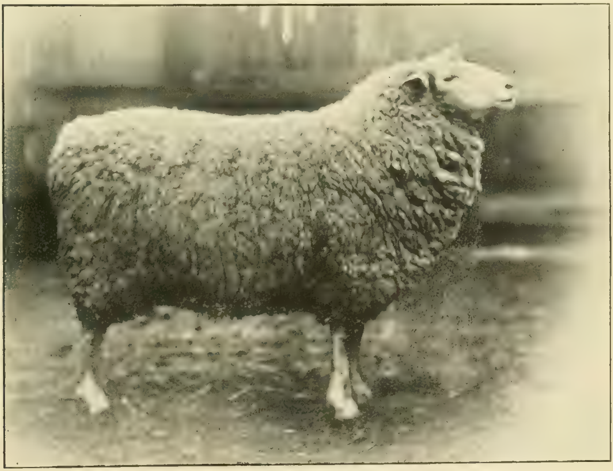


B. Cotswold Ewe Teg.
Both the property of Russell Swanwick, Royal Agricultural College Farm, Cirencester.

[*F. Savory, Cirencester.*

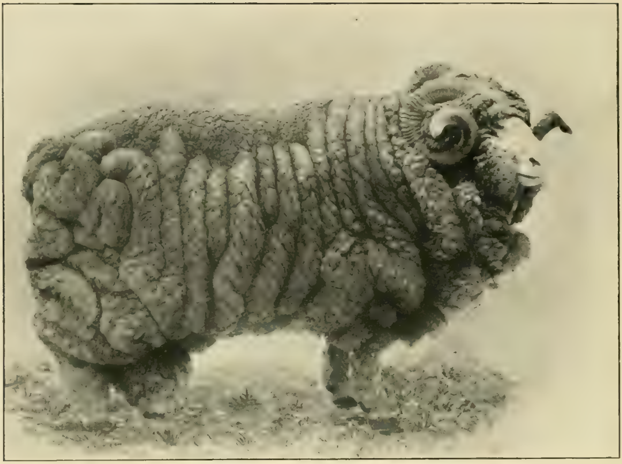


A. ROSCOMMON EWES.
First prize pen of Hogget Ewes. When dressed they made an average weight of 43½ lb. per quarter.
Bred and owned by M. Flanagan, Tulsk, Co. Roscommon.

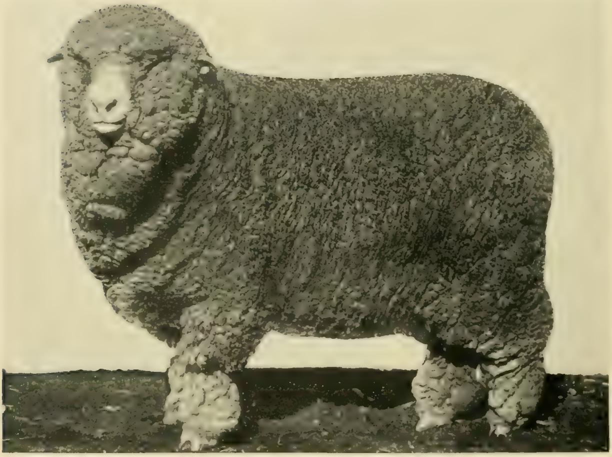


B. ROSCOMMON RAM.
Owned by Matthew Flanagan, Lomona, Tulsk, Co. Roscommon.

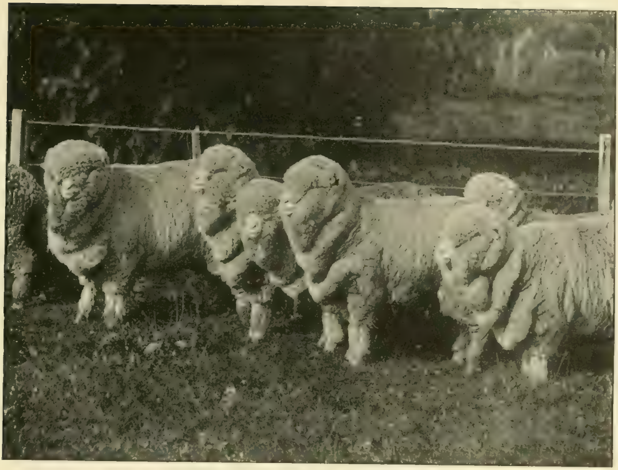
[Photos by J. Lafayette, Ltd., Dublin.



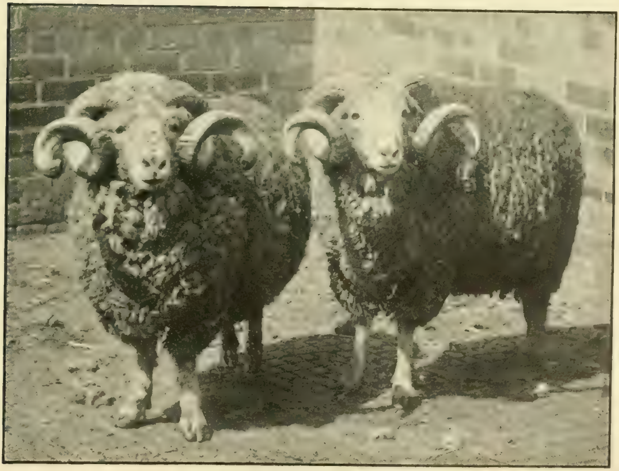
A. MERINO RAM, "CANNIE CHIEL" (BY "ECLIPSE").
Strong comb, Champion ram, New South Wales S.B.A., Sydney, 1903.
Bred by Hon. S. M'Caughey, Coonong, Narrandera, N.S.W.



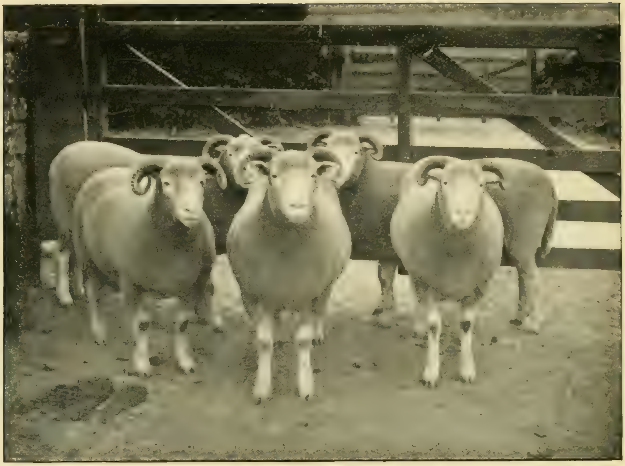
B. PLAIN SKINNED CHAMPION MERINO EWE, "STELLA" (BY "STARLIGHT").
Bred by A. J. Murray, Mount Crawford, S. Australia.



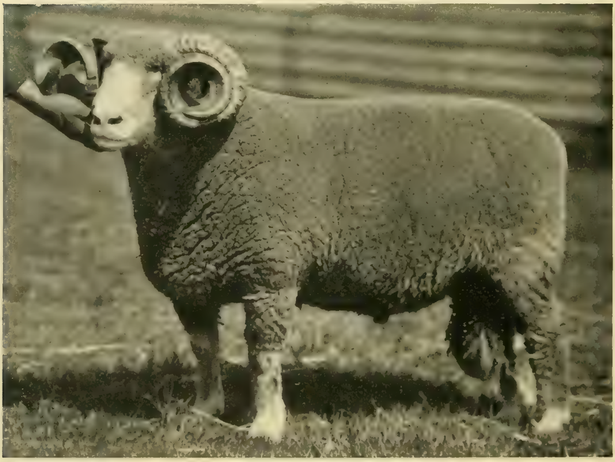
A. Merino Ewes, $1\frac{1}{2}$ to $3\frac{1}{2}$ years old.



B. Merino-Scotch Blackface Cross Rams.
Owned by L. A. Macpherson, Corrimony, near Inverness.



A. Dorset Horn Ewes.
The property of H. Davis, Preston Farm, Milverton.



B. Dorset Horn Shearling Ram.
First at Plymouth and First at Cambridge Royal as a two-shear.
Owned by F. J. Merson & Son, Bridgewater.

[*"Agricultural Gazette Photograph."*

N. Farmer, Leeds Abbey, Maidstone, Kent; T. File, Court Lodge, Brook, near Ashford, Kent; Arthur Finn, Westbroke, Lydd, Kent; L. H. and G. W. Finn, Westwood Court, Faversham, Kent; The Earl of Guilford, Waldershare Park, Dover; Lord Harris, Belmont, Faversham, Kent; O. C. Millen, Upper Farm, Sutton, Dover; S. W. Millen, Copton Manor, Faversham, Kent; W. Miskin, White Hall, Hoo, Rochester; T. Pilcher, The Bower, Mersham, Ashford, Kent; J. Egerton Quested, The Firs, Cheriton, Kent; H. Rigden, Etchinghill, Shorncliffe, Kent; G. C. Solley, Richborough, Sandwich, Kent; Ashley Stevens, Davington Hall, Faversham, Kent; R. S. Strouts, Singleton, Great Chart, Ashford, Kent; Hon. S. P. Tufton, Digge, Westwell, Ashford, Kent; Executors of T. Vickers, Sarness Farm, Waltham, near Canterbury; Lieut.-Col. G. C. H. Wheler, M.P., Palace Farm, Charing, Kent; W. F. Wood, Chekes Court, Sittingbourne, Kent; C. F. Wood, Teynham Court, Sittingbourne.

The South Devon, or "South Dum," is an ancient local long-wool breed of conspicuous merit, the principal breed in Cornwall, and very largely met with in Mid-Devon. It was brought into general notice by the formation, in 1903, of the South Devon Flock Book Association, and the issue of the first volume of the *Flock Book* in 1904. E. H. Hoskin, of Cartuther Barton, Liskeard, is credited with taking the lead in establishing the Association. The particulars of no less than 164 flocks, and a list of 191 members are recorded. Many of the foundation flocks date back considerably over a century, although others have been established within twenty years. It is claimed that the South Devon sheep possesses great robustness of constitution, is large, symmetrical, and well-grown, with plenty of bone and muscle; vigorous and thrifty, and equally adapted to the fold or to grazing land; a rapid feeder, and one that readily responds to liberal treatment, but able to thrive upon hard fare and in exposed places. The fleece is of great merit—a long staple of strong lustre wool, curly and dense on the pelt, and free from kemp. The head is broad and rather long, and rough with wool; the ears fairly long, of medium thickness, covered with hair, often spotted. The carcase is noted for being full of lean meat, and for good development of the valuable parts. The Smithfield records of 1902 are ample evidence of the early maturity of the breed. The first pen of wether lambs gave the average daily gain per head of 11·46 oz. from birth, and the premier pen of wethers 7·57 oz. each. The South Devon differs from the Devon Long-wool in being larger, and in having a heavier fleece.

Names and addresses of fourteen **principal breeders**:—

In Devon—Mrs Fairweather, Malston, Sherford, Kingsbridge; J. R. Hallett, Sherford Barton, Brixton, Plymouth; John Hoare & Son, Mount Barton, Staverton, Totnes; T. Maye, Croft, Charleton, Kingsbridge; Mrs Nicholls & Son, Berry Farm, Totnes; H. H. Pain, High House, Kingsbridge; S. S. Horton, Lixton, Loddiswell, Kingsbridge.

In Cornwall—W. C. Bice, Nanswhyden, St Columb; E. H.

Body, Twelvewoods, Liskeard; P. G. Brown, Tremadart, Barton, Duloe; Wm. Hawke, jun., Trebuddannon, St Columb; E. H. Hoskin, Cartuther Barton, Liskeard; W. F. Sobey, Trenant, Liskeard; W. D. Spry, Camels, Veryan, Grampound Road.

The Devon Long-wool sheep is a local breed which is likely to become better known to the foreign buyer as a result of the establishment of a *Flock Book*, the first volume of which appeared in 1900. Low's *Domesticated Animals of the British Isles* (1845) shows that the breed was formed from two originally distinct breeds of great size, but coarse, inferior quality, by crossing with the improved Leicester, viz., (1) the "Southam Notts" breed in the south from the vale of Honiton westward, "with brown faces and legs," carrying "a fleece of long wool, moderately soft, weighing from 9 to 10 lb.," the wethers scaling, at thirty months old, 22 to 25 lb. per quarter; (2) the "Bampton Notts" breed on the borders of Devon and Somerset. "They had white faces, a very heavy fleece of long wool, and weighed 30 to 35 lb. per quarter at two years old." The first introduction of Leicester blood gave very satisfactory results, but modern attempts to use it to refine the breed further have not been satisfactory. It is claimed in the historical statement in vol. i. of the *Flock Book*, that the breed possesses size and strength of constitution, a heavy fleece of excellent wool, and a long, wide, and deep carcase of excellent mutton, not over fat. It is admitted to be irregular in type, different sections being kept on such a great variety of soils, and at such different elevations above the sea. The ewes are usually good nurses, and the lambs strong, active, and easily reared. The rams of this and of the South Devon breed will no doubt in time prove useful sires in a foreign country like the Argentine, when put to cross-bred flocks that possess too much Lincoln blood, for the production of the best quality of mutton and lamb for exportation. The breed claims to have produced the heaviest recorded carcase of a sheep fed in this country—that of a wether weighing 78 lb. per quarter, bred and fed by Thomas Kingdon, of Thorverton, Devon, killed in 1846. The Bath and West of England was the first Agricultural Society to offer special prizes for the Devon Long-wool breed, at Taunton Show in 1870.

Present-day breeders include the following:—Albert Abid, Dulford House, Cullompton; Sir Ian Heethcoat Amory, Knightshayes, Tiverton; Wm. Brent, Clampit, Callington, Cornwall; R. Cook, Crazelowman, Tiverton; Walter Dinnis, Landreyna, Coads Green, Launceston; E. M. Glanville, Moor Farm, Crediton; J. E. Heard, West and South Petherwin, Launceston; J. M. Kittow, Trossel, Egloskerry; Edwin Lawrence, Rull, Cullompton; Lucas & Sons, Great Beare, Marhamchurch, Bude; George Palfrey, Cudmore, Bampton; Thomas Parkin, Higher Whiteleigh, North

Petherwin, Egloskerry; T. S. Parkin, Trewithen, Laneast, Egloskerry; T. J. Pearcey, Peadhill, Tiverton; J. G. Pedler, Sampford Peverell, Tiverton; A. Shattock, Stallengthorne, Hockworthy, Wellington, Somerset; W. E. Stanbury, West Balsdon, Whitstone, Holsworthy; Fred White, Torweston, Williton, Taunton, Somerset.

The Cotswold derives its name from the Cotswold Hills; but as is pointed out in the first volume of the *Flock Book*, the "sheep gave the name to the hills—the 'wold' or wild open country of the sheep-cotes." Gloucestershire, which may be regarded as the centre of the home of the Cotswold sheep, was in the time of the Romans, early in the second century A.D., the seat of a large trade in the manufacture and sale of woollen cloth. From this it may be inferred that considerable care was devoted by our ancestors, even at this remote time, to the breeding of sheep, which there is no reason to doubt were the progenitors of the Cotswolds of the present time; so that the breed may be one of the oldest, if not the oldest, in Britain. The trade in both sheep and wool was maintained throughout both Saxon and Norman times, and for many years a considerable number of Cotswold sheep were annually exported to Germany, to the United States of America, and other foreign parts, where they were appreciated for their large size and for the power they possess of stamping their distinctive characteristics when crossed with other breeds; but now the breed is out of fashion and has dwindled in numbers in competition with other more refined if less robust breeds.

They, too, were improved by introduction of Leicester blood. They are extremely hardy, and well suited for feeding on stiff land, even when it is pretty wet. The flesh becomes coarse when sheep grow aged. At twelve to fifteen months old, tegs ought to weigh 25 to 28 lb. per quarter. Those more moderately fed, and "run over" till two years old, get up to 35 lb. or more per quarter, but their mutton becomes too rank for present-day taste.

Points.—Faces strong, usually white, sometimes grey, with legs to match. Dark colouring on these parts gives the Cotswold more the look of a Down cross, and helps to sell the mutton at a higher price. A large tuft of wool covers the forehead, and when full grown ought to hang down almost to the nostrils. The ewes are fairly good milkers; and they are also prolific when not too fat or with too large a rump. The fleece of wool averages from 8 to 10 lb. for ewes. The fibre is long, neither close nor too open, and rather coarse in quality. The belly, and particularly the scrotum or "purse," should be well covered with wool.

Through being an old breed of good size, it is well suited for crossing with ewes of short-wooled, smaller boned, and finer varieties, provided the head of the ram is not so large as to cause the ewes serious difficulty in lambing their get.

The Roscommon Long-wool is now the only remaining distinct Irish breed of sheep, believed to be centuries old. It is noted for being "a hardy and active forager," and "a big upstanding sheep, taller than either the Cotswold or Lincoln, of great substance and quality, which thrives well either on bleak exposed uplands, or on its native fertile plains, and is consequently a good tenant-farmer's sheep. It was indebted for its improvement in symmetry, like all other British Long-wools, to the English Leicester. It is also claimed that careful selection of rams by private breeders has probably had more to do with the breed's present improved position than any other influence. It is not an early-maturity breed, being fed naturally and not forced, although the ewes, which are hardy, good milkers, produce early-maturity lambs by Shropshire and other early-maturity rams. Mature sheep of both sexes make heavy weights, as records in the *Roscommon Sheep Breeders' Flock Book*, established in 1895, show: for example, a three-shear ram dressed to 288 lb., or 72 lb. per quarter; a ram lamb to 28 lb. per quarter; hogget rams to 50 lb. per quarter; and old ewes to fully the latter weight. There are now forty-two breeders who belong to the Association.

Points.—The head is hornless, and gaily carried; the face long and white, with or without a tuft of wool on the forehead; the muzzle of the ram strong; the ears fine in texture, white or pinky, and of medium length; the tail broad, and well set in; the fleece white, long, and heavy, with a broad staple and bright texture. At the block test competitions at the Dublin winter shows, the mutton has been proved to be "splendidly grained, evenly mixed with fat and lean and of excellent quality."

The **home county** occupied by the breed is of a cold and bleak nature, not far inland from the sea, so it generally gets the full benefit of any storms. The land is not fit like Meath or West Meath to fatten animals. There is practically no shelter, so the sheep are quite hardy to enable them to withstand a rough climate. The centres thickly stocked are Elphin and Tulsk.

Prominent and **successful breeders** include:—George R. Acheson,[1] Rush Hill, Drumsna, Roscommon; Frank Flanagan, Tomona, Tulsk, Roscommon; Patrick J. Fitzmaurice,[1] Elphin, Roscommon; John Keane,[1] Baltacken, Moyvore, West Meath; M. J. Kenny, Freagh Castle, Miltown-Malbay, Clare.

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[1] Most successful at shows.

CHAPTER XXX

SHEEP (*continued*)—SHORT-WOOLS, INCLUDING THE DOWN BREEDS

Horned White-Faces—The Merino—Dorset Horn—Western Sheep—**Hornless White-Face**—The Ryeland—**Hornless Dark-Faced Down Breeds**—Southdown, or Sussex—Shropshire—Dorset, or West Country—Hampshire—Suffolk—Oxford.

HORNED WHITE-FACED SHORT-WOOLS.

THE **Merino.**—In the matter of wide distribution, this breed occupies among sheep the position held by the Shorthorn among cattle. By far the largest number of sheep in the Australian Colonies, in the Argentine Republic, in the United States of America, and at the Cape of Good Hope, belong to this breed, or to crosses nearly related to it. All are believed to have sprung from the Spanish Merino,[1] though there are many distinct types known by special names—as, for example, the Vermont Merino, the highly-bred American sheep; the Rambouillet, or French Merino; the Negretti, to which the German Merino belongs; the Saxon Merino; and the various offshoots of these varieties to be found in the colonies of Australia and Tasmania.[2]

Description.—The breed is white in hair, hoof, horn, and wool[3]; the bare portion of the muzzle is of an orange fleshy colour (white being objectionable); the eyes are light grey; the horns in the male are well developed, spirally coiled inwards, but the great majority of the ewes are without horns, and when horns do appear they are comparatively insignificant. To the touch, the back is thin-fleshed and slightly elevated at the withers, and the backbone rather sharp. The skin of some breeds is often very much wrinkled, more particularly about the neck, but the great majority of the Australian Merinos are comparatively plain skinned. Irrespective of the difficulty of shearing, wrinkles are not liked in the camp, except as an indication of purity of breed. If the progeny of Vermont and other wrinkled sheep did not lose the wrinkles, the infusion of fresh blood of this kind would be less in favour. There is a tendency to the production of coarse wool fibre, especially on the crowns of the wrinkles when these are large and numerous. Wool should be abundant, so that at shearing-time little but the nose and hoofs are to be seen projecting from a flouncing ball of white wool. The part of the face not clad with wool should be covered with soft, silky hair. In well-bred sheep the wool is close, dense, and fine; though it varies in these characters, as well as in length and profusion, in the different varieties of the breed, and even within these varieties, according to the local conditions in which they are reared and kept. Sheep generally produce finer wool after they have been once shorn. Uniformity in quality is striven for; the wool of the hind-quarter or thigh should not be hairy or strong in staple, but resemble the wool of the side or fore-quarter as much as possible. On being parted for inspection, down the side, shoulder, or back, it should divide freely, without any sign of adhesion or matting, which stamps it as inferior for the purposes of combing wool. A fine, wavy, bright staple should appear down the sides of the opening (a condition usually more pronounced near the fore-quarter than on the thigh), and at the bottom a bright flesh-coloured streak of skin. A real Merino fleece, as it grows on the sheep, should be firm as a board, packed like a cauliflower, and the tips of the wool even, neither fuzzy nor straight, nor standing up in places. With greater length of staple, not a natural characteristic of the breed, the density which is of so much importance may be lost.

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[1] Probably introduced into Spain by Phœnicians or Carthaginians about 1100 B.C.

[2] For details of the different strains of Merino blood, see the Author's work on the *Rural Economy and Agriculture of Australia and New Zealand* (1891). See also *Sheep Breeding in Australia*, by George A. Bruni (Walker, May & Co., Melbourne).

[3] A black flock of pure Merinos was established by the late Hon. W. Allen, of Braesides, Dalveen, Queensland, in the early eighties of last century. It once numbered 2000, but it was at a later date reduced to about 650, and finally discontinued because they did not pay as well as the white. Black ewes mated with a black ram breed true to colour, the tongue, the roof of the mouth, and the skin being black, with the exception of a white spot on the forehead and another on the tip of the tail. They yield about $\frac{3}{4}$ to $1\frac{1}{2}$ lb. less of wool than white sheep, but it has sold at nearly double the price although the market is unsteady. The sheep are very hardy, and "their jumping powers are extraordinary."

There were in 1893 several **breeders of pure Merino sheep** in this country, all of whom gave a favourable report of the success of this cosmopolitan breed, even in our humid climate, which is very different from that of the parched-up country from which the Merino was originally dispersed. Among these may be mentioned the names of Sturgeon & Son, Grays Hall, Essex; Finlay Campbell, Brantridge Park, Balcombe, Sussex; L. A. Macpherson, Wirley Grove, Pelsall, Staffordshire; Purvis Russell, Warroch, Milnathort, Fifeshire. The Grays Hall flock (dispersed in 1894) was descended from a choice lot of Negretti Merinos, consisting of four rams and forty-six ewes, imported from Spain in 1791 by George III. The Brantridge Park flock was begun in 1885 by the importation of ten ewes and two rams from New South Wales, the direct and pure-blooded descendants of the famous Camden Stud flock, which was formed by blending the blood of a number of Merinos imported into that colony from the Cape in 1797, with a selection made in 1804 from the Royal flock above referred to. The ancestors of the Wirley Grove flock were imported from Canterbury, New Zealand, in 1887, and an offshoot of the flock was established with success at an elevation of 550 feet above sea-level, at Corrimony, twenty-four miles from Inverness. Much valuable information regarding the character of the Merino when bred in this country has been provided by the history of a flock of about four hundred pure-bred Merinos, which was kept for a period of thirty years, prior to 1870, by Thomas Drewitt & Sons, auctioneers, Guildford. Finlay Campbell, who was a most enthusiastic admirer of the breed, died in 1915, and the Brantridge flock containing the only Merino sheep left in the country passed to his son, W. F. Campbell, and now numbers fifty.

We have it on the authority of John Thornton & Co., who bought a number of casts from them in 1914, that this was the best of the various flocks named, and that the wool sent to the London market made the price of top grade Colonial Merino. The ewe's clip averages about 5 lb. per fleece.

It is generally supposed that Merino wool is liable to degenerate when grown in this country, but the consensus of opinion of those who have personal experience is against this view, if care be taken in breeding, and if the animals be not forced with rich food. Samples submitted to London experts have been pronounced equal to the best class of New Zealand wool in respect of quality, density of staple, and growth. There is also a decided prejudice against Merino mutton imported from the Argentine Republic, and from Australia and New Zealand, owing to its dark colour, especially after it has been frozen, and its thinness as compared with home-fed British mutton. Merinos are undoubtedly chiefly famous for wool production, and they are slow in coming to maturity for the butcher, the mutton being prime at three years old; but at its best, when produced on natural food, the mutton is not inferior to that of our mountain breeds. Crossing with most of our early-maturity breeds has proved successful in hastening maturity in the produce.[1]

The Dorset Horn is a sheep with white face and legs, and a pink or flesh-coloured nose like that of the old Somerset breed, which seems to have been a superior variety of the white-faced but black-nosed Dorset, which, according to Morton's *Cyclopædia of Agriculture*, was "one of the oldest and best of the Upland short-wooled horned races—a breed prevailing in Dorset, Somerset, and Devon." Since the *Flock Book* was started in 1891, the term "Somerset Horn" has been dropped. **Spooner says** of it:—"The Somerset sheep is a variety of Dorset possessing the same peculiarities, and differing from it in being larger and taller but lankier, and in having more arched profiles, and pink noses and lips instead of black or white. The wool, too, is somewhat longer, and the lambs are larger." The Somersets were said to have greater fecundity, though not such good mothers. The former distinctions, including the black noses, have disappeared with in-breeding and selection. The lamb arrives at maturity more quickly than the Downs, and in certain districts Down flocks have been superseded by the breed. "The chief home of the leading Horn flocks is now in the southern and western parts of the county, with Dorchester as the centre, and in the Isle of Wight, where very old-established and extensive flocks are kept." Edward Lisle, in his *Observations in Husbandry*, 2 vols., (published by his son, Thomas Lisle, 1756), referring to journeys in Dorsetshire between 1693 and 1712, said of the Dorset Horn sheep, that "His tenant, 'Farmer Stephens,' had ewes which brought him lambs at Christmas which he sold fat to the butcher at Lady Day (March 25th), Anno 1707, and, at the beginning of June, thinking his ewes to be mutton, they looked so big he went to sell them to the butcher, who handled them and found their udders springing with milk and near lambing, and they accordingly did lamb the first week in June." The general features are pleasing. The head stands well up, the horns are thin, with a symmetrical curl, the face rather long and thin, and the eye quick and lively. The heart-girth is specially good, and the hind-quarters squarely set and well fleshed down. The ewes are excellent nurses, and produce 130 to 180 per cent. of lambs; they are good folding sheep, and the mutton is well flavoured. The breed had a class to itself for the first time at the Royal Show at Battersea in 1862.

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[1] See also p. 592, giving experience in the breeding of Merinos in Sutherland.

Thomas Halford, writing (1898) on Kerry Hill sheep (p. 628), says that the Dorset Horn breed, just before the middle of the 18th century, was "so like the pure Welsh sheep, with the exception of size, that I thought they had been imported from Wales. I did not know then that the counties of Somerset, Devon, and Cornwall had been part of Wales, and existed as West Wales in early times, and that the aborigines had been pure Welsh. I now quite believe that these Dorset sheep are the indigenous breed of the country, and were left behind by the Welsh when they had to escape from their foes across the Bristol Channel to South Wales."

The **general management of the breed in Dorset** is as follows:—About one to one and a half ewes are kept to the acre, according to the quality of the land and the amount of water meadow and pasture attached to it. They require plenty of room, and are generally allowed to roam the pasture in the daytime, being brought on the arable land at night. They take the ram fully two months earlier than any other breed, and the general lambing time for the flock ewes is November and up to the middle of December. The off-going ewes are sold barren in May, and in lamb in September and October, and most drop their lambs in September and October, the lambs being fattened for the London market. The flock ewes generally lamb down on the grass; they are then put on roots, the lambs being allowed to run forward. The stock lambs remain with the ewes till May, when they are weaned, and go on to good grass till the fodder crops—rye, vetches, or trifolium—are fit to feed. They remain on vetches till about the end of June. As most of the lambs are fattened, they receive as much cake and corn as they will eat, about $\frac{1}{4}$ to $\frac{1}{2}$ lb. per head per day, with generally some peas. With such keep they are in a good season fit to turn out about the first week in April. The lambs born in October and November receive good feeding, and are generally ready for the butcher at from ten to twelve weeks old, when they average from 10 to 14 lb. per quarter. They then make top prices in the London market. The off-going ewes are fattened-off as well as the lambs, and, when they have been highly kept, are ready for market at the same time. They average from 22 to 28 lb. per quarter. Shearing generally takes place in June, when both the lambs and ewes are shorn. The lambs yield from $2\frac{1}{2}$ to 3 lb. of wool, and the ewes from 5 to 7 lb., and yearling rams from 10 to 14 lb. The wool of the Horn lamb is much prized on account of its whiteness and the fine point it possesses, whilst the fleeces command high prices. The breed usually divides with the Ryeland the premier awards for fine white short wool at the Royal Show. A ram and sheep show is held on the third Thursday in May. The **chief markets** for the breed are held at Dorchester in May and September. The Poundbury Fair was established in 1848, and twelve to sixteen thousand sheep are there annually exposed for sale.[1]

The **special peculiarity** of the breed is, that the ewes take the ram as early as April or May, and breed "house-lamb" for Christmas. They are ready to take the ram again soon after lambing, and two crops in a year may be got, although the practice is not one that can be recommended for general adoption. The ewes are often tupped for the last season by a Southdown ram, so that the lambs possess dark heads with no horns, and become ripe sooner. Downs or Down crosses are usually supposed to give the best quality of mutton, and hence the run upon dark faces and legs The breed adapts itself to a great variety of soil and climate, and may produce 200 per cent. of lambs: *e.g.*, in New Zealand, in 1906 a flock surpassed the home record.

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[1] The above condensed account is borrowed from the prefatory note in vol. i. of the *Dorset Horn Sheep Breeders' Association Flock Book*, by Thos. H. Ensor, Secretary, published at Dorchester in 1892.

The Principal Breeders of Dorset Horn Sheep are:—L. C. Attrill (33), Battingbourne, Godshill, Isle of Wight; R. E. Bennett (135), Chesilborne, Dorchester, Dorset; A. A. Broughton (84), Impens, North Petherton, Bridgwater, Somerset; F. P. Brown (306), Kingston Farm, Chillerton, Isle of Wight; A. Cheek (268), Rowborough Manor, Carisbrooke, Isle of Wight; C. H. Crawford (86), Mappercombe, Powerstock, Melplash, R.S.O., Dorset; F. E. S. Groves (41), Winterborne Monkton, Dorchester, Dorset; C. Foot (148), Bincombe, Dorchester, Dorset; H. C. Hancock (283), Milverton Court, Taunton, Somerset; C. Hawkins (4), Waddon, Dorchester, Dorset; E. G. Heal (398), Newclose Farm, Thorley, Yarmouth, Isle of Wight; T. J. Horlock (52), Doles Ash, Piddletrenthide, Dorchester, Dorset; J. W. Hull (38), Stinsford, Dorchester, Dorset; R. S. Hunt (79), Poundbury Farm, Dorchester, Dorset; A. Johnson (192), Symondsbury, Bridport, Dorset; M. J. Kidner, Fermington, Kingston, Taunton; G. A. and R. A. Kingswell (315), Wellow Farm, Yarmouth, Isle of Wight; Geo. Mayo (6), Cokers Frome, Dorchester, Dorset; F. J. Merson & Son (7), Farringdon, North Petherton, Bridgwater, Somerset; J. Osmond (34), West Stafford, Dorchester, Dorset; J. I. Studley (129), Little Toller, Dorchester, Dorset; H. Cawley Way (257), Arreton Manor, Newport, Isle of Wight; H. E. Warder, Taverland Manor, Brading, Isle of Wight.

Since 1911 there have been exports to Denmark, Canada, The United States (Boston, Chicago, Kentucky, Massachusetts, New York, Ohio, Pennsylvania, Vermont (U.S.A.), Virginia, Wisconsin), Trinidad, Adelaide, Brazil, and other parts of South America, Wellington (New Zealand), and South Africa.

The Western sheep is a remnant of an old slow-maturity, white-faced horned Wiltshire breed, described by Low as the "largest of fine-wool sheep of England. Its fleece was not only light (about 2½ lb.) but its belly was destitute of wool." This is attributed to the warm, dry chalky soil of the area. Like the old

Hampshire, which it strongly resembled, it was rapidly supplanted or crossed out by the early-maturity and symmetrical Southdown, and its modern representative now fattens quickly when grass comes. Plates of the gaunt and ungainly pure breed are given in the illustrated edition of *Low's Domesticated Animals.* The **present localities** of the modern representatives of the breed are in the neighbourhoods of Aylesbury, Bucks, and Northampton, where a number of farmers keep small flocks; viz., J. B. Morris, Hoggeston, Winslow, Bucks, and E. Berrey, Brampton, Market Harborough, Northampton. The largest, numbering about sixty ewes, is that of C. H. Monk, Sheepcote Hill, Aylesbury, who has bred them pure since about 1880. Although somewhat like the Dorset Horn when the latter is newly shorn, they are of quite a distinct breed, but, probably owing to the difficulty of procuring fresh blood, some farmers have crossed their flocks with the Dorset. The **striking peculiarity** of the Western sheep is that it produces a very light, worthless coat of hairy wool which falls off in April and May, except in the case of sheep in low condition, on which it clings a few weeks later. The lambs even peel all over in July as clean as if they had been shaven. They are born with long tails, and the numbers of twins produced is above the average of other breeds. Ram lambs are in great request at an average price of about £8, a rise of £4, 10s. since 1914, for crossing with Kent, Border Leicester, Hampshire, or Welsh ewes to produce fat lambs. Western-Hampshire crossbred lambs dropped in February or March weigh from 6 to 8 stones (8 lb.) in the end of May or beginning of June. Plate CXCVII. A shows typical representatives of this breed of sheep, which are symmetrical, thick at the heart-girth, and weigh heavier than they look. Ewes frequently scale 11 to 12 stones each. They take the ram about the middle of September. The black spots on the skin are characteristic of the breed, but thought by some to be the result of in-breeding. The grey shading which appears on the noses of some sheep is probably derived from an early dash of Southdown blood.

HORNLESS WHITE-FACED SHORT-WOOLS.

The **Ryeland breed**, named from "a district in the southern part of Herefordshire, on which rye used to be grown," is discussed at considerable length by Youatt (1837), but with a deal of speculation and uncertainty. It appears to have been originally a small but very hardy white-faced polled breed, and so able to live and thrive on scanty fare, that Sir Joseph Banks declared "that it deserved a niche in the temple of famine." The weight of fleece rarely exceeded 2 lb., but "it possessed a degree of fineness unequalled by any other British breed." There was a strong resemblance to the Merino ewe, which, "with the peculiar character of the wool, led to the suspicion that the Ryeland was of foreign extraction." The exceptional practice of cotting or shutting them up in close houses—where they were fed at night "with hay, barley-straw, or pease-haulm"—during winter, to preserve the wool and save them from rot, was accepted as additional evidence of the truth of the conjecture, although "the Hereford breed of sheep [presumably the Ryeland] was well known so early as the year 1343." The Ryeland strongly resembled one of the various strains of early Shropshires, not only in wool but in "form and appearance." "Our earliest writers on the sheep speak of the Ryeland as at the head of the short-wooled breeds"; and according to Herbert this breed "almost exclusively, in early times of sheep-husbandry, extended from the Thames to the Tyne, and the Cotswolds were produced by a cross between the Ryeland and some heavy sheep. . . . In the course of years the Ryelands were gradually displaced by a heavy sheep over the greater part of the counties other than Herefordshire." It is on record that King George III. (1760-1820), of Spanish Merino fame, blessed the Ryeland breed in the following royal words:—"He is not in the least ambitious of acquiring any further sort of foreign sheep, but by due attention to improve the National Sheep of this Island, of which the Wiltshire improved by rams of the best Somerset flocks, the true Hereford Ryeland sheep are those he prefers."

When Merinos were first introduced into England it was sought to make them hardier by repeated crossing with the Ryeland, but "the scheme was abandoned," as was also the attempt to cross the Ryeland with the Merino, "since they appeared as if they were varieties of the same breed, as the first cross detracted much from the beauty of the English sheep, although the wool was improved and the tendency to fatten not impaired." "The Ryelands were also crossed, and that to a very considerable extent, by the Leicesters, but at great sacrifice of the fineness of the wool. It was likewise thought that the delicate flavour of the mutton in the Ryeland sheep was impaired and almost lost, although that of the Leicester was improved." By this means the Ryeland wool was converted into a combing quality—the fibre being "lengthened and somewhat thickened, fitting it for other and exceedingly valuable purposes"; and the Ryeland sheep, which could scarcely be much improved in bulk by selection, was enlarged in carcase and lengthened in fleece by careful and repeated crossing. The greater part of this change took place between 1800 and 1828, though at the latter date it was still actively progressing. The old Ryeland's **fattening record** on turnips was to produce "before Lady Day almost as much loose fat within them as they were pounds per quarter. . . . The superabundant fat did not load the muscles externally, as in the Leicester . . . and the flesh was on that account more generally acceptable," more especially as it "developed particularly on the loins and haunches."

Ladylift, in the *Hereford Times*, 20th December 1902, ventures the theory that the name of "Ryeland" was corrupted from "Rhulan," a district of Radnorshire, which at one time possessed a much wider signification than it bears at present. In support, he goes on to say that:—

> "The sheep from which the celebrated Leominster wool was shorn—the 'Lemster ore,' as it is called by Drayton and Camden—and which are commonly supposed to be identical with the Ryeland, are spoken of by celebrated writers—by Dyer in his *Fleece*, and by Philips in his *Cider*—writers who were not only poets but distinguished as antiquaries—as 'bred in Cambria,' which assertion is corroborated by the learned annotator of the latter poem, the Rev. Charles Demster . . . who goes further, and fixes the part of 'Cambria,' whence they came, as the 'Radnorshire Hills.'"

A local writer says:—

> "Camden, in describing the town of Leominster, said:—The greatest name and fame is of the wool in the territories round about it, which, setting aside that of Arabia and Tarentum, all Europe counteth to be the verie best. Low considered it probable that it was descended from the soft-wooled sheep supposed to have been in the possession of the earliest Celtic inhabitants of the British Islands. From time immemorial the tract of country lying between the Severn and the mountains of Wales carried a small, hornless breed, noted for the softness of their wool. In the county of Hereford it was most frequently met with; though it spread into other districts, reaching Monmouthshire in the south, and Shropshire in the north (where its successors have long been known as the Clun Forest breed). The breed also extended eastward into Gloucester and Warwick. There were many local names attaching to the breed. Ultimately it obtained its modern name of the Ryeland breed from certain sandy tracts formerly devoted to the production of rye, situated southward of the River Wye. The breed originated at a time when the country was little cultivated, but was in a state of extensive forests and heaths. It had to exist on poor soil and herbage; it is not surprising, therefore, that it was of small size."

The **modern Ryeland**[1] exemplifies what Youatt says of the general good qualities of the breed. Its size and wool-cutting properties have been increased without materially affecting either the hardiness of the sheep or the quality of the mutton. In a good flock, wethers at twelve months weigh 18 to 20 lb. per quarter, and ewes at two and three years old from 20 to 25 lb. While the breed does best on good sheep land, it thrives on tracts of cold, damp soil growing inferior herbage, where other breeds would starve. The average yield of wool in a flock where the lambs are kept as tegs is 8 lb. per fleece, and the quality is so fine that it usually carries off the premier prize in its class at the Royal Show, or it shares the honours with the wool of the Dorset Horn breed.

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[1] Indebtedness is acknowledged to the late John T. Pinches, Secretary, also to the Preface of vol. i. of the *Ryeland Flock Book*, written by him, as the result of personal knowledge dating back to 1850; and to vol. ix. (1921).

The typical Ryeland.—In the Ryeland ram, breeders require a good masculine *head*, medium in length, broad at the top, with narrow face. The top of the head should be well covered with *wool*, which must also come well up to the cheeks, but the face below the eyes is clear with the exception in some cases of a narrow strip of wool running down each side of the face, no wool growing across it below the eyes. A Ryeland must see distinctly; too much muffling of wool about the head denotes a weak, slow-thriving sheep.

The *colour* of the face and legs is a dull white, as distinguished from the china white of the Border Leicester, which is objectionable in this breed. Face and legs must be free from any trace of grey, and the head of horn. A strong and broad *neck* is essential: it gives the head a bridled appearance, and produces a smart look when either standing or walking.

Ram buyers like to see that the *shoulder-blades* are set well apart, and the *spine* level from the base of the neck to the setting on of the tail. There should be no perceptible rise of the loin or depression behind the shoulders. Again, the *tail* or *dock* is broad, and set on fairly level with the back. The *leg of mutton* is full and well let down, whilst the *legs* below both knees and hocks stand well apart, falling straight from the animal with no inclination inwards either at knees or hocks. The *ribs* should be well sprung, the *breast* broad and fairly deep, and the *body* well let down so as to form a good bottom line. The *feet* are compact and firmly set. A loose, sprawling foot sometimes interferes with a ram's usefulness.

The Ryeland men require the *fleece* to be fine in fibre, deep in staple, and thickly set on the skin. Every part, including the belly and purse, must be well covered. When handled, the fleece should feel firm to the hand; when viewed, it should have a close, level appearance. Avoid any grey, coarse hair. If extra heavy wool-cutting is desired, the idea of extreme closeness of coat must be modified to some extent.

The *skin* around the nose and eyes should be black, the *ears* of fair length and carried slightly back, of a dark colour, not grey, but either of a brown shade without hair, or with white hair, spotted with black. The ears are sometimes covered with short wool, which, of course, must be white, but an ear free from wool is preferable. A white smooth ear or a white nose shows anything but Ryeland character, and should be avoided.

Grey or tanned legs should be discouraged, and judges are asked to bear this in mind.

As a sire the Ryeland ram is most impressive, and in high favour for producing fat lambs by ewes of his own or other breeds. The lambs are generally born fat, and when well managed they retain their condition in virtue of their natural hardiness of constitution. **The ewes** have been repeatedly used as the foundation on which to start to breed up a Shropshire flock, on account of their symmetrical form and hardy constitution.

Ryeland sheep were supplanted to a large extent some years ago during the rage for Shropshire and other improved Downs, but the tendency of recent times has been to breed them up again, and to improve the form by selection. It was estimated in 1903 that there were only about thirty flocks of Ryeland sheep in existence at that time—twenty-five being located in Hereford and Brecknockshire, and two or three in each of the counties of Monmouth, Gloucester, and Worcester.

In vol. ix. of *The Ryeland Flock Book*, issued in 1921, there were 106 registered flocks and a list of 99 present members. The pleasure derived from a well-kept private Flock Book is referred to, also that individual merit as well as pedigree should be carefully studied. The Society favours tattoo marks in preference to notches, ear clips, or tags. It is also bent upon establishing a collective system of marketing wool.

A writer in the *Mark Lane Express* in November 1921, reviewing the year's show season, declared that the most improved breeds of this year were the Ryelands and the Wensleydales. Ryelands had made great strides within the last few years, and at shows in the West of England had recently led all other breeds. "Our only fear is that the fine dense fleece, which has been the making of the breed, is going to be sacrificed in an attempt to make the Ryeland an all-round animal." He added: "It would, of course, be almost impossible to say which was the best out of the twenty-seven breeds on exhibition" (at the Royal Show in 1921), "but we would place the Romney Marsh, the Kerry Hills, and the Ryelands all very near the top."

Leading Owners of Registered Ryeland Flocks:—A. E. Baldwin, Underley, Tenbury; H. A. Christy, Llangoed Castle, Llyswen, Breconshire; F. T. Gough, Lugwardine, Hereford; R. R. Gribble, Gabriels Manor, Edenbridge, Kent; Mrs Constance L. Herbert (of Clytha), Clytha Park, Abergavenny; C. H. Hobbs, Oldport, Oswestry, Salop; Mrs Gwynne Holford, Buckland, Bwlch, R.S.O., Breconshire; C. C. Jacobs, Mappletons, Bradfield, near Reading; D. James, Pancross Farm, near Cowbridge, Glam.; G. F. Lewis, New House, Stretton Grandison, Ledbury; George Victor Manwaring, Lingfield Lodge, Edenbridge, Kent; W. Parkin-Moore, Whitehall, Mealsgate, Cumberland; D. J. Thomas, Talachddu, near Brecon.

HORNLESS DARK-FACED SHORT-WOOLS.

The Sussex, or **Southdown**, is the breed through which all the other Down breeds have been formed, by crossing it with the old-fashioned varieties of the different districts. It is short-legged, and in all respects most compact and symmetrical, but particularly good in the hind-quarters. The present improved and peculiarly handsome form of the breed has been attained by selection from the original stock, which was light in the fore-quarters, and leggy. No outside blood was introduced.

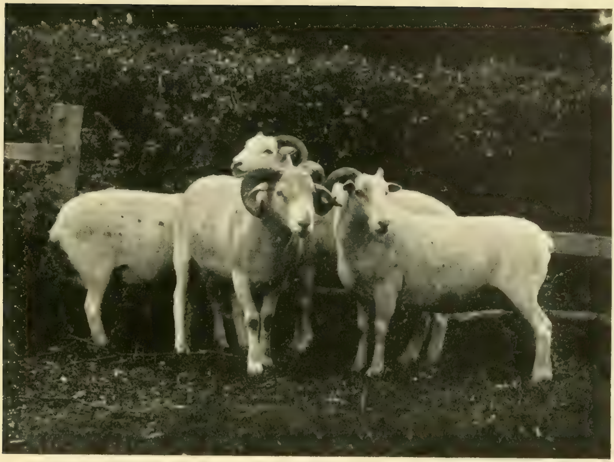
Distinguishing Characteristics and Points of the Modern Southdown.

General Character and Appearance (10). *Head*, small and neat, wide and level between the ears, with no sign of slug or dark poll (8). *Face*, full, not too long from eyes to nose, of one even mouse colour, not approaching black or speckled; under jaw, light (4). *Eyes*, large, bright, and prominent (2). *Ears*, of medium size, and covered with short wool (2). *Neck*, wide at the base, strong and well-set on the shoulders; throat clean (5). *Shoulders*, well set, the top level with the back (7). *Chest*, wide and deep (5). *Back*, level, with a wide flat loin (10). *Ribs*, well sprung and well ribbed up, thick through the heart, with fore and hind flanks fully developed (7). *Rump*, wide and long and well turned (4). *Tail*, large, and set on almost level with the chine (4). *Legs of mutton* (including thighs, which should be full), well let down, with a deep wide twist (10). *Wool*, of fine texture, great density, and of sufficient length of staple, covering the whole body down to the hocks and knees, and right up to the cheeks, with a full foretop, but not round the eyes, or across the bridge of the nose (10). *Skin*, of a delicate bright pink (5). *Carriage*, "corky," legs short, straight, and of one even mouse colour, and set on outside the body.

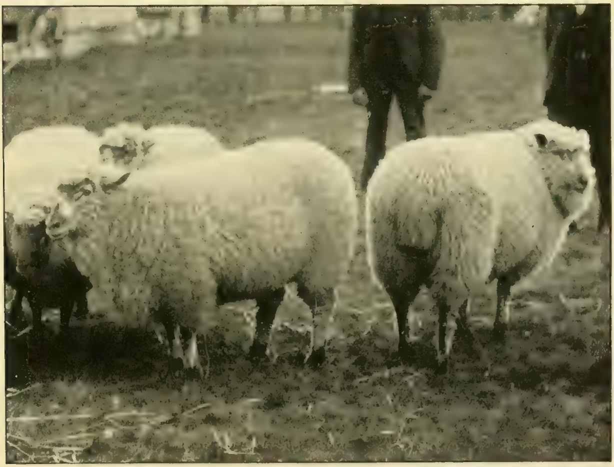
Disqualifications for prizes, even with otherwise good sheep: (*a*) horns, or traces of their having been present; (*b*) dark poll; (*c*) blue skin; (*d*) speckled face, ears, or legs; (*e*) bad wool.

The fleece is short, close, and of fine quality, and should be free from hard projecting fibres; that from a ewe weighs up to 5 or 6 lb. Open, long, coarse wool has been imported into some flocks in the attempt to increase the size by crossing, and it is very objectionable. Any darkness or dullness in the colour of the skin when the wool is parted is also an objectionable feature in the show-ring.

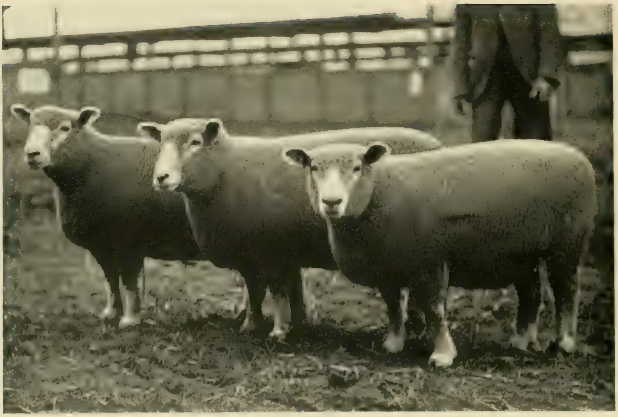
The flesh is of excellent quality, but it can be easily made too fat. The average weight for well-kept tegs should be about 18 lb. per quarter at twelve months. The offal, as compared with that of other breeds, is of small amount. Fat wethers rising two years old, belonging to Earl Bathurst, and sold in Cirencester market in the first week of December 1884,



A. Western or Old Wiltshire Ram and Ewes.
The property of C. H. Monk, Sheepcote Hall, Aylesbury.

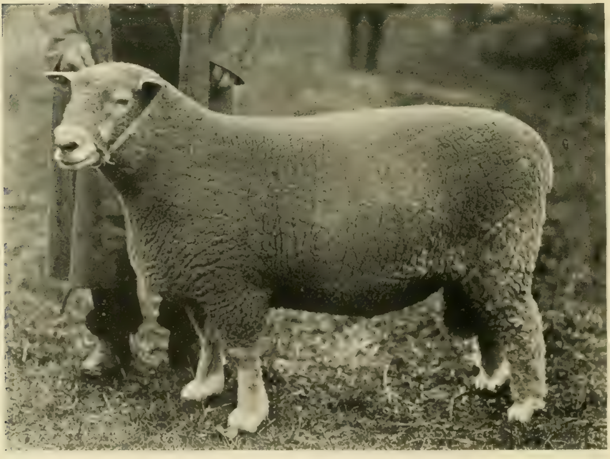


B. Cross-bred Tegs from Dorset Ewes by a Shropshire Ram.



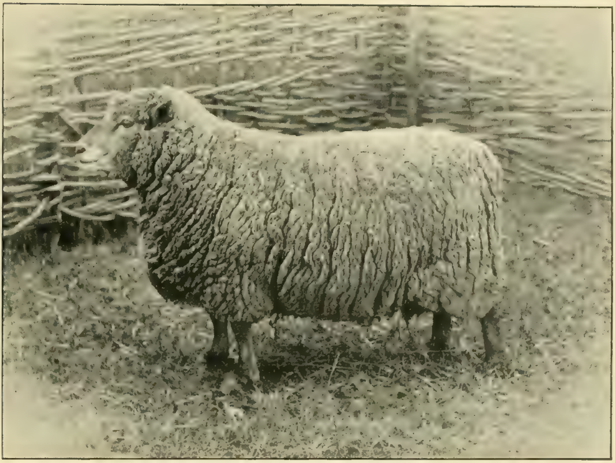
A. Ryeland Ewes.

[*J. T. Newman, Berkhampstead.*

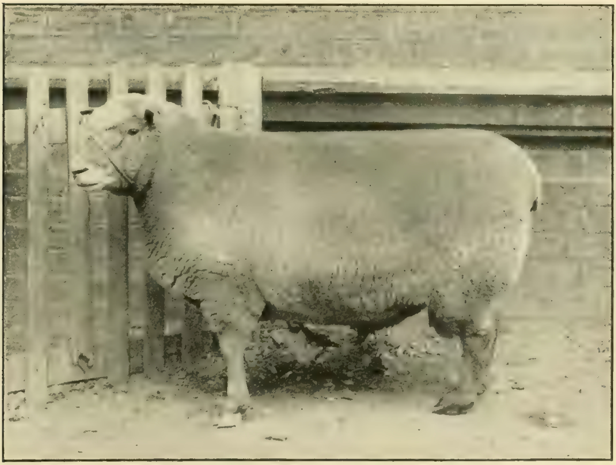


B. Ryeland Shearling Ram.
First, R.A.S.E. Show, Park Royal, 1905.
Owned by W. T. Barnley.

[*J. T. Newman, Berkhampstead.*



A. Southdown Ram, in "field" condition, after service.
Champion, Royal Counties Show, 1900.
Exhibited by Pagham Harbour Co., Selsey, Chichester.



B. Southdown Ram, "Babraham Buller" (3530).
Champion, R.A.S.E. Show at York, 1900.
Bred and shown by C. Adeane, of Babraham Hall, Cambridge.

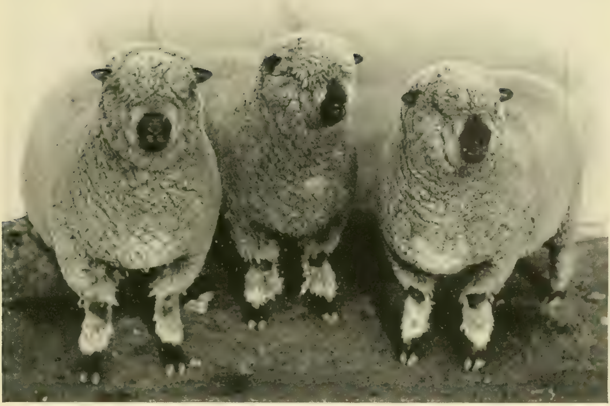
[*R. H. Lord, Cambridge.*

A. Southdown Ram Judging, Royal Show, 1905.
His Majesty King Edward's Champion in the foreground.

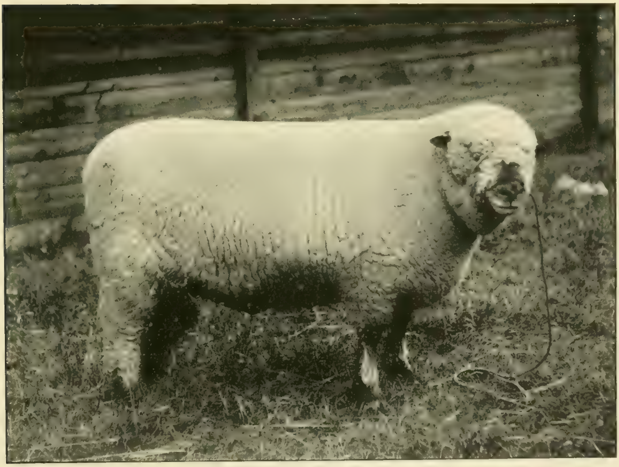
[*J. T. Newman, Berkhampstead.*

B. Southdown Shearling Ewes.
First and Special prize at Fakenham, 1921.

[*"Agricultural Gazette Photograph."*

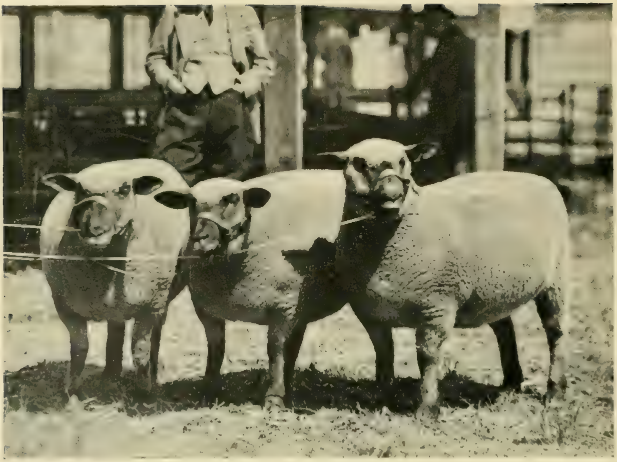


A. SHROPSHIRE SHEARLING EWES, SIRED BY "BALAKLAVA HERO."
First prize-winners at the R.A.S. of Victoria, Australia.
Bred by T. J. Burbury, Jericho, Tasmania.

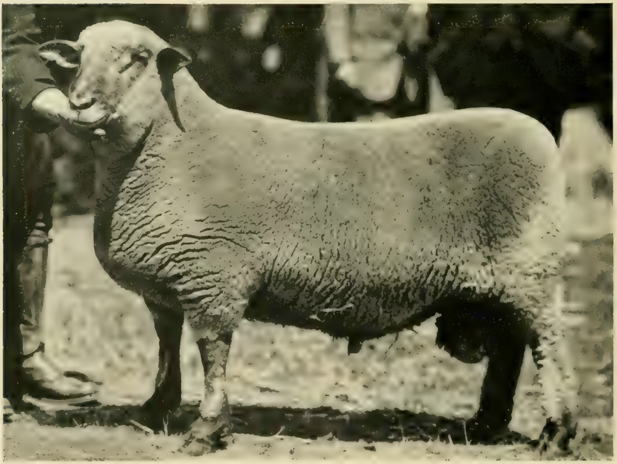


B. SHROPSHIRE SHEARLING RAM.
Won six First prizes, including the R.A.S.E. and H. & A. S., 1904; also First at the Royal in 1903 and 1905. Owned by Sir R. P. Cooper, Bart., Shenstone Court, Lichfield, Staffs.

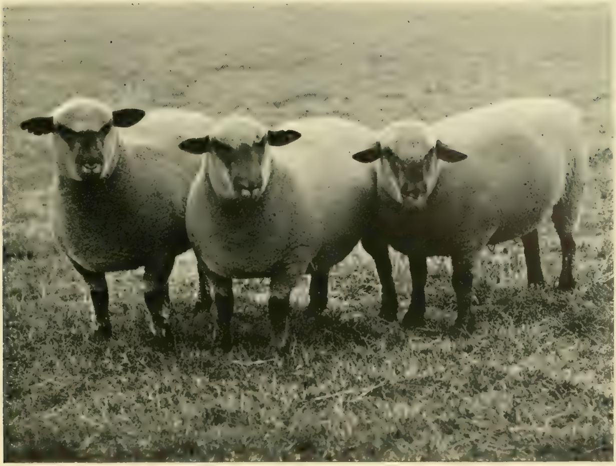
[Both photos by G. H. Parsons, Alsager.



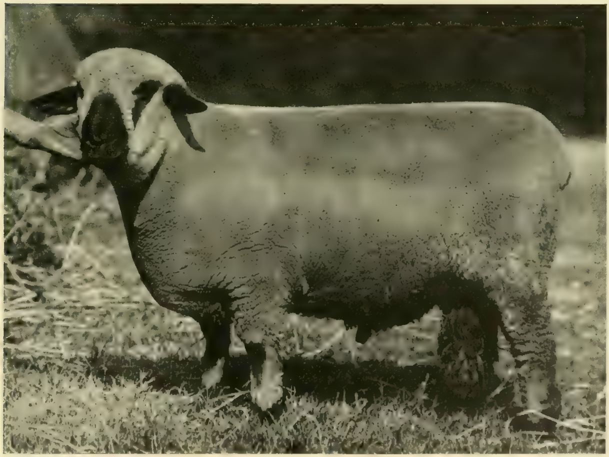
A. Dorset Down Shearling Ewes.
Second Royal Counties, 1921. Owned by R. N. Tory, Blandford.
[*"Agricultural Gazette Photograph."*



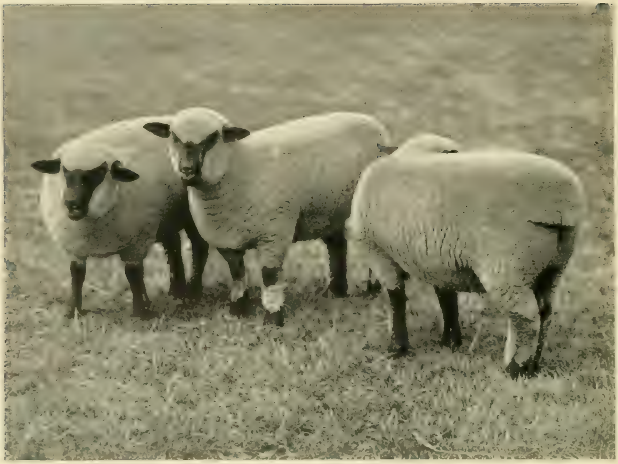
B. Dorset Down Shearling Ram.
First, Bath and West Show, 1921. Owned by P. and C. Seward, Hants.
[*"Agricultural Gazette Photograph."*



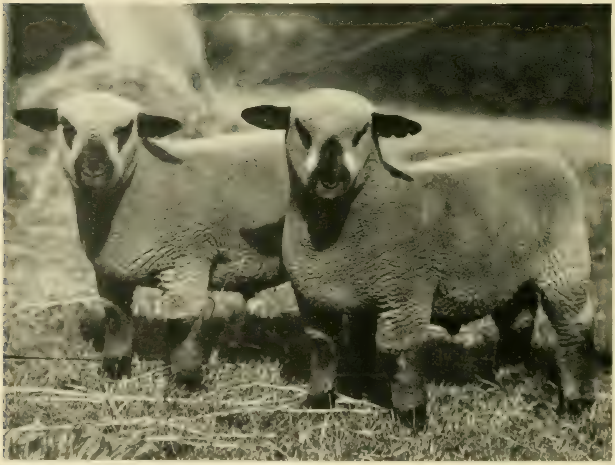
A. Hampshire Down Shearling Ewes.
First, R.A.S.E. Show, Park Royal, 1905. The property of James Flower, Chilmark, Salisbury.
[*C. Reid, Wishaw.*



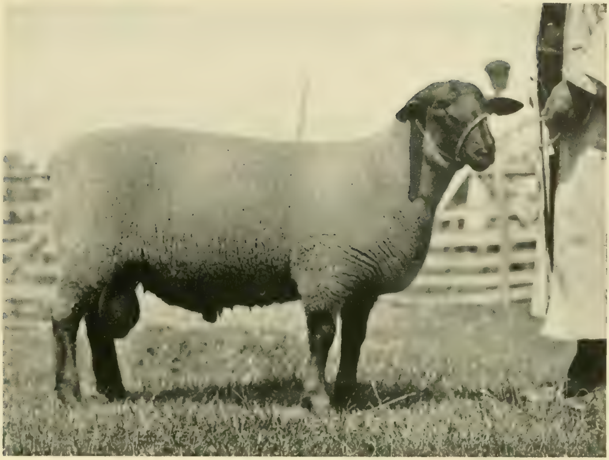
B. Hampshire Down Shearling Ram.
First at Derby Royal, 1921. Owned by Mrs Jervois.
[*"Agricultural Gazette Photograph.'*



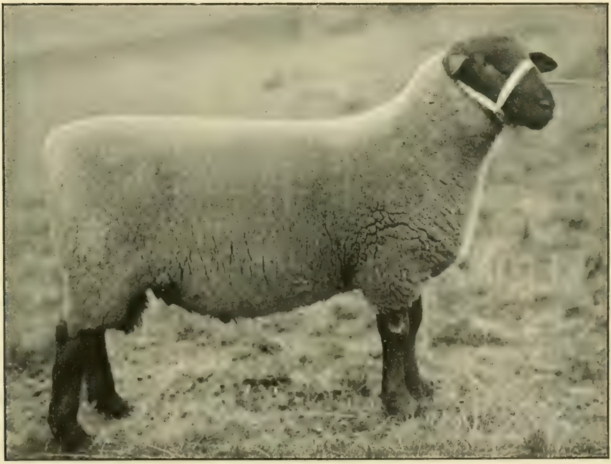
A. Hampshire Down Ewe Lambs.
First, R.A.S.E. Show, 1905. Owner, H. C. Stephenson.
[*J. T. Newman, Berkhampstead.*



B. Hampshire Down Ram Lambs.
First at Plymouth. Owned by Major A. Morrison, D.S.O.
[*"Agricultural Gazette Photograph."*

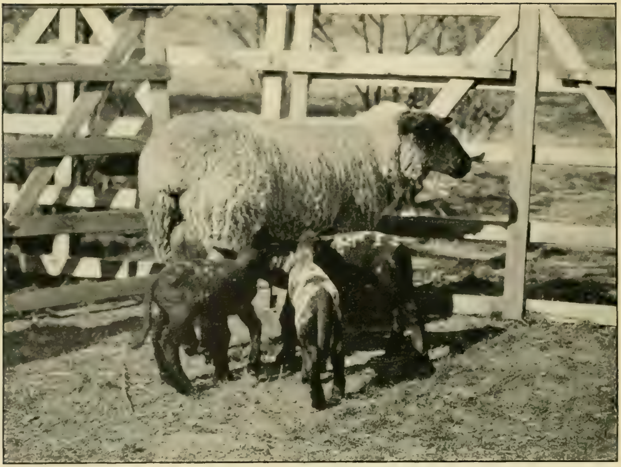


A. Suffolk Down Ram Lamb.
Bred by H. E. Smith and bought by C. R. C. Foster, Anstey Hall, for 200 guineas; top price at the S.S. Society's Annual Sale at Ipswich, August 1922.

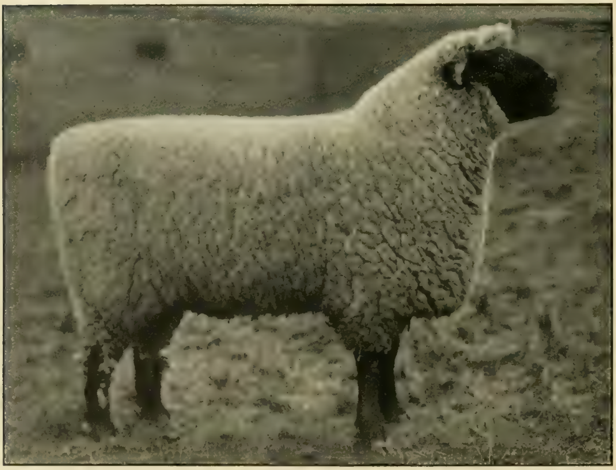


B. Suffolk Tup Lamb.
President's Medal at Stirling Highland Show, 1921.
Bred and shown by G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

[*Block lent by Highland Society.*

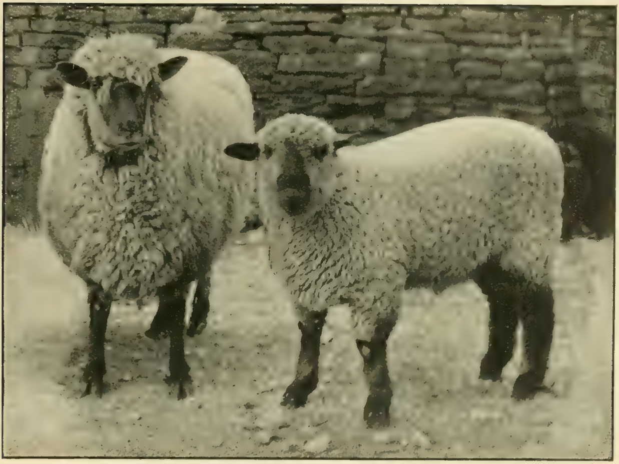


A. Suffolk Down Ewe, with Triplets.
Imported into New South Wales by G. R. Jackson, Ferndale, Mohonga, *via* Altury, N.S. Wales.

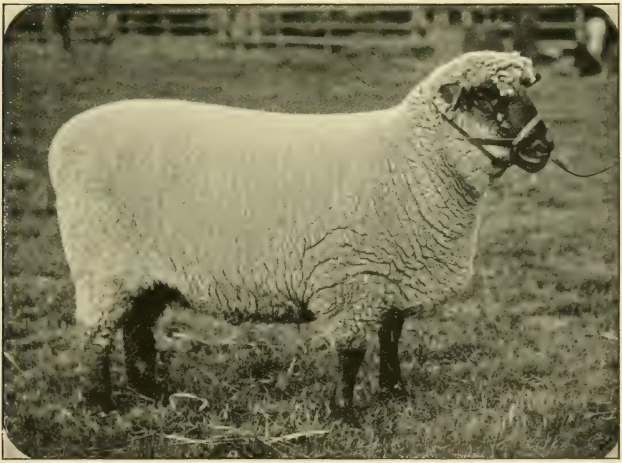


B. Oxford Down Shearling Tup.
President's Medal at Stirling Highland Show in 1921.
Bred by T. and M. Templeton, Sandyknowe, Kelso.'

[*Block lent by Highland Society.*

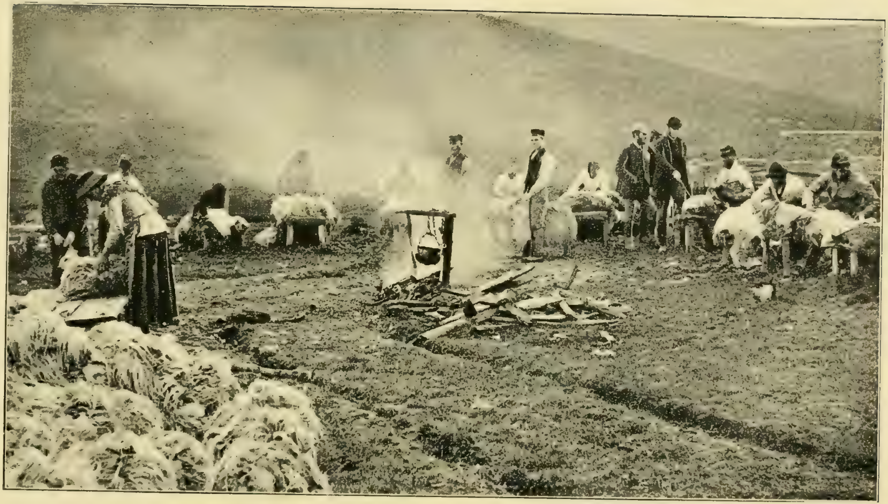


A. Oxford Down Ewe and Lamb.
From the breeding flock of the late John Tredwell, Upper Winchenden, Aylesbury.



B. Oxford Down Shearling Ram.
Champion at the R.A.S.E. and other Shows.
Bred at Heythrop, and sold to D. Maclennan for Buenos Aires.

PLATE CCVIII.



SHEARING SCOTCH BLACKFACE MOUNTAIN SHEEP AT OVERSHIELS, STOW.
The late James Archibald, fourth from the right, stamping on the "buist" mark. See p. 705.
Left—Wool (unwashed) rolled with tips out and shorn end in.

dressed to 138 lb. per carcase, or 34·5 lb. per quarter dead-weight, and yielded 65·83 per cent. dead-weight to live-weight. But since that time the demand for sheep of this age and size has almost disappeared.

The original habitat of this breed was the region of the South Downs of Sussex and the neighbouring counties. Low described them as "a range of low chalky hills 5 or 6 miles in breadth, stretching along the coast upwards of 60 miles, and passing into the chalky lands of Hants on the west." The old beliefs, that the sheep are not good rent-payers, except in their native district, and specially liable to foot-rot, have been disproved by modern experience.

The genius who began in 1778 to take the lead in improving the breed was **John Ellman.** He occupied for fifty years the farm of Glynde, near Lewes, in Sussex. In the time of **Arthur Young**, who wrote in 1788, the Southdown was speckle-faced, and one of the smallest of many local varieties of fine-wooled, but ill-shaped, semi-mountain breeds of sheep, producing mutton of extremely fine flavour. Ellman has recorded[1] that "at the outset of the work of improvement little in-breeding was practised. As improvement progressed it was otherwise, and the difficulty of obtaining good animals from other flocks was an impediment to development. For many years the Southdown sheep were remarkable for their strength of constitution, but the Bakewell school hurried improvements at a hazardous pace." Although Bakewell urged it, the Southdown breed was never crossed with the improved Leicester. Whatever the origin of the breed, which is lost in antiquity, there can be no manner of doubt that the influence of situation, including elevation, climate, and soil, on the light chalk formation, as well as the management, greatly influenced their size, quality, and appearance, and the character of their wool. There was at one time an agitation to divide the breed into two types: the "Upperdown" sheep, resembling most the original Southdown breed, and the short-necked, wide-chested, short-legged "Underhill" sheep, which began by taking most of the prizes at the leading shows. The proposal was strongly opposed by the great majority of Southdown breeders, and now there is only one type, the ideal being a little additional size, at the same time retaining the quality of the smaller type.

Ellman predicted what would happen, when he wrote:—"The rich pastures of inland counties deteriorate the quality of the mutton, and interfere with other properties which have distinguished for ages this hardy race. I do not imply that

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[1] In a paper revised by his son, Thomas Ellman of Beddingham, and published in the *Report of the Proceedings of the Southdown Sheep Club* in 1893.

Southdown sheep cannot retain properties to recommend them for general purposes, even when fed upon rich pastures, *but unless fresh blood from Sussex Downs is frequently introduced into those breeding flocks* which are removed into other districts, *the resemblance*, *the quality of mutton and wool*, will be changed, and the *hardiness* of the animal interfered with."

Low stated that "it is to the effects of careful culture, under favourable circumstances, that the modern breed of the Southdown owes the superiority which it has acquired over all the other short-wooled sheep of the Midland and Southern counties of England. With the advancement of tillage, and the larger proportion of turnips and other succulent plants, the breeders of Sussex had the means of treating their animals well while advancing to maturity; while increased attention was given to the selection of the breeding parents, and to the consequent calling forth of those properties of form which evince the tendency to arrive at early maturity of muscle and fatness . . . The breed has spread over a great tract of country, and either superseded the pre-existing varieties, or been so mingled with them as to have modified all their characters. . . . It has superseded the ancient breeds of Berkshire, Hampshire, and Wiltshire, and greatly circumscribed the limits of the horned Dorsets. . . . It has extended into Herefordshire, and partly into Devonshire and the lower parts of Wales, and northwards even to Westmorland and Cumberland. But, beyond the limits of the true chalk, or of the calcareous districts in contact with the chalk, it is only found occupying tracts of narrow extent, or is employed as a means of improving the flocks of the heaths, commons, or other tracts which are still occupied by races of small short-wooled sheep." Prior to 1814 there was a premium upon the breeding of Short-wools to supply the home demand for the manufacture of woollen cloth, but the market was lost to the home producer when, on the advent of peace, Europe and Australia sent increasing quantities of Merino wool, which was finer, and proved to be more suitable for the purpose. From that time forward the larger Long-wooled sheep of the lower country have extended and displaced many of the Short-wooled varieties, or, in certain cases, become mingled with them.

In wool production, Southdowns compare favourably with other breeds. They do not grow so much wool per sheep as some breeds, but their fleeces are of fine quality, close, thick and heavy in proportion to the size of the sheep. As a mutton producer the Southdown is remarkable. A fat eight-stone Southdown fetches about the same sum as a fat twelve-stone sheep of the heavier breeds. Three Southdowns will consume about the same quantity of food as two sheep of the larger breeds. No breed surpasses the Southdown for quickness of feeding and early maturity. Lambs dropped early in January, near Chichester, are often sold fat to the butcher in April.

The *Southdown Flock Book* is published annually by the Southdown Sheep Society (incorporated). Vol. xxx. was issued in 1921.

The following is a short list of the **Principal Breeders** and **Prize Winners** in 1921:—H.M. The King, Sandringham, Norfolk; The Earl of Derby, K.G., Newmarket; Sir W. B. M. Bird, Eartham, Chichester; Rev. C. H. Brocklebank, Bartlow, Cambridge; Sir Jeremiah Colman, Bart., Gatton Park, Reigate, Surrey; B. J. Dare, Poling, Arundel; P. Filkins, Ovingdean, Brighton; Lady Fitzgerald, Buckland, Faringdon, Berkshire; R. S. Hicks, Great Wilbraham, Cambridge; John Langmead, Yapton, Arundel; Walter Langmead, Wicks, Yapton, Arundel; Lady Ludlow, Luton Hoo, Luton, Bedfordshire; W. F. Rudwick, West Wittering, Chichester; W. W. Smith, The Hills, Stedham, Midhurst.

There are 201 registered Southdown flocks in this country at present (1921).

All registered sheep must, commencing in 1922, be tattooed with the Society's trade-mark. This official compulsory tattooing will undoubtedly attract more foreign and colonial buyers, who will have a larger selection of flocks from which they can purchase. In the past, they have been confined to those of flock-masters who have catered for their demands by trade-marking. In addition, a hardier type of sheep will be available.

The show record of Southdowns in recent years is unique. At the Chicago International Show, the Southdown is usually **champion** over all breeds. In 1918 it won the Wether Championship, the Car-Lot, and the Champion Carcase of the show—the three principal prizes of the show for fat sheep. All the winners in the carcase classes, for wethers and lambs, were Southdowns except one, a grade Southdown. In the breeding classes, Southdowns outdid the greatest show ever before seen at Chicago. Again, in 1919, all the prizes in the carcase competitions were won by Southdowns or grade Southdowns, the Grand Champion Carcase being a grade Southdown lamb, described as "well-nigh flawless in every way." Southdown lambs also won the Grand Championship for car-lots of fat sheep. In 1920, Southdowns won the first and second in the wether class, and third in the lamb class.

In the latter class, first and second prizes were won by cross-bred Southdowns. In addition, they won the Grand Championship for the best car-load of live sheep. According to the American Southdown Society, the demand for Southdowns during the past few years has been the best in their history. The reputation of the breed in the United States as a "mutton" sheep is as unchallenged as it is in this country.

At the **Smithfield Show**, London, their successes have been remarkable. In 1915 the champion prize for the best carcase out of eighty entries of various breeds was awarded to a Southdown wether lamb. In the class for pure-bred wether lambs, first and second prizes were won by Southdowns, and in the class for cross-bred wether lambs, second, third, and fourth prizes were won by Southdown crosses. In 1916 they gained the Double Championship—alive and carcase—over all breeds. In 1920, Southdowns achieved another remarkable victory by winning the Open Double Championship, alive and dead. This makes the twenty-third time that Southdowns have been champions at the Smithfield Show out of a total of forty-nine shows held from 1869 to 1920. In the same period the championship has been won eight times by Suffolks, and eight times by Hampshire Downs, these being the next in order of success.

The Shropshire is a medium-sized breed, and is the most cosmopolitan of all the Downs, owing to the thick and uniform cover of flesh on its back when handled for the butcher at any age; its hardiness of constitution and tendency to early maturity; its wonderful adaptability to many differing soils and climates; its unique success in crossing with sheep of almost any pure breed, or the common mongrels which constitute a large proportion of the sheep population of the world; its fairly heavy fleece of good bright wool, the superior quality of its mutton, and to some extent the darkness of the hair of the face and legs, which in common with similar darkness in other breeds, is generally held as an indication of superior quality of mutton. Over 2000 registered Shropshires were exported during 1906 to the following countries:—Australia, New Zealand, Tasmania, Japan, Canada, United States of America, Argentine, Uruguay, Chili, Brazil, Jamaica, Demerara, Natal, South Africa, Algiers, Germany, France, Russia, Spain, Sweden, Denmark, and Finland.

The Foundation Stock, from which the modern Shropshire breed has been developed since the beginning of last century, was the original breed of Shropshire and Staffordshire. It was described in 1792 by the Bristol Wool Society, quoted by Professor John Wilson, of Edinburgh University, in vol. xvi. of the *Journal of the Royal Agricultural Society*, as follows:—"On Morfe Common, near Bridgnorth, there are about 10,000 sheep kept during the summer months, which produce wool of a superior quality. They are considered an ancient breed, are black-faced, or brown or spotted-faced, horned sheep, little subject to either rot or scab, weighing—the wethers from 11 to 14 lb., and the ewes from 9 to 11 lb. per quarter, after being fed with clover and turnips, and clipping near 2 lb. per fleece; this appears to be the original stock from which the present breed of Shropshires has sprung." The Morfe Common sheep was said by Youatt to "resemble the Ryeland in many points," or to be a variety of that breed. Cannock Chase, in Staffordshire, also produced a similar but heavier type of sheep, from which many of the Staffordshire flocks are descended. There can be little doubt but crossing with the improved Southdown was the means by which the early slow-maturity breed was developed into the modern hornless form.[1] The two pioneer breeders were Samuel Meire, of Berrington, and afterwards of Harley; and George Adney, of Harley; the blood of their flocks is to be found in "nearly every flock of repute at the present day." The improved Shropshire got a strong impetus to its further development by the recognition of the breed at the Royal Show at Gloucester in 1853, "but it was not till 1859 that it was admitted into the Royal Society's prize sheet and recognised as a distinct breed." At the Royal Show in 1862 there were 133 Shropshires of all classes present, in 1874 there were 186; but in 1876 the numbers rose to 509, and in 1884 to 876. At the 1884 show, held at Shrewsbury, sixty exhibitors hailed from fifteen counties, whereas the Southdowns—the great rivals of the time—that were present came from eleven breeders located in six counties, and 875 Shropshires were exhibited as against 420 of all other breeds. The irregularity of type which at one time existed in the breed has disappeared.

The ewes are prolific, as "with ordinary management at least 50 per cent. of doubles may be looked for." In 1896, 11,666 ewes *reared* 168 lambs per 100 ewes. Multiple births increase with age up to four years and remain fairly constant. The age of the ram has no influence on the percentage of multiple births.[2] They are well adapted as cast ewes for the "lamb and dam" trade, "for not only do they feed their lambs well, but as a rule they are ready for the butcher when their lambs go." The breed is responsible for having supplanted or reduced in numbers many of the original breeds of the country, possessing as it does "all the quality of the Southdown, with considerably more size, and carrying a large proportion of lean meat to fat." For example, it has encroached upon the Roscommon breed in Ireland, where it is in high favour; upon the Southdown, the Ryeland, the Cotswold, besides numerous local English breeds, which have entirely disappeared. Although it has established itself in full perfection as a pure breed with Thos. A. Buttar, at Corston, in Forfarshire, it has been overshadowed by the Oxford Down as a sire of cross lambs in the Scottish Border country. It was extensively tried in Scotland for this purpose about 1884, but the crosses, when kept to finish on turnips in spring as hoggs, proved to be smaller than Border Leicester crosses, and failed to supersede them. Another disadvantage of the Shropshire when used to cross with sheep on hill pasture, is that the lambs for the first few days are too bare to resist the cold in wet and stormy weather. The breed has had unparalleled success as a sire in all countries producing the main supplies of mutton imported for the British market, with the conspicuous exception of Argentina, where every other breed was for a time bested by the Lincoln—the chief consideration of sheep-breeders then being the quantity and quality of long wool. In more recent times the Corriedale and Romney Marsh have come into favour. In New Zealand, where "there is no sheep equal to the Shropshire for producing lambs for freezing," crosses three or four months old weigh 39 lb. each carcase. The success of the Shropshire as a general-purpose sheep for the production of mutton and wool is focussed in a *brochure* issued by Alfred Mansell & Co., Secretaries to the **Shropshire Sheep Breeders' Association and Flock Book Society**, Shrewsbury, England, in 1901. The Association was formed in the autumn of 1882, and a history of the breed by Alfred Mansell, College Hill, Shrewsbury, appeared in vol. iii. of the *Flock Book* in 1885.

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[1] Prof. D. D. Williams, in the *Farmer and Stock Breeders' Year Book*, 1907, associated the Long Mynd County breed with the ancestry of the Shropshire.

[2] "Fertility in Shropshire Sheep," by Elmer Roberts. *Journal of Agricultural Research*, Washington, D.C., vol. xxii., October 22, 1921.

Points.[1]—"*The Ram* should be masculine in character; face not too long between eye and muzzle; strong nose; broad between the eyes and between the ears; strong, thick neck, well arched into shoulder; head and face completely covered with fine white wool, except the nose, which should be a mellow black; ears also dark in colour, and small or medium; fleece very dense, fine, and of medium length; the whole body and legs covered with an equal quality of wool—coarse wool about the thighs, or light, thin wool on the shoulder points being great faults, as also black or grey wool. The skin should be pink, and free from blue or dark spots; the body square, on short, straight, stout legs, without gross, coarse bone, and the back and ribs well covered with lean flesh."

The Ewe possesses the same characteristics, but should be feminine and gay in appearance, having a finer head and neck. A good average weight for a fleece in an ordinary ewe flock is 7 or 8 lb.; those of ram tegs and highly-fed ewes more; but heavy "clips" of wool are frequently coarse.

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[1] Prepared by Thos. A. Buttar, Corston, Coupar Angus, N.B.

Prominent Breeders of Shropshire sheep include:—Lt.-Col. E. C. Atkins, Stretton House, Hinckley; F. and F. B. Bibby, Hardwicke Grange, Shrewsbury; R. E. Birch, Maes Elwy, St Asaph; J. J. Brewin, Llysmeirchion, Trefnant, Denbighshire; H. A. Brown, Grendon, Atherstone; Joseph Brown, Wolgarstone, Penkridge; T. A. Buttar, Corston, Coupar Angus, N.B.; C. L. Coxon, Milton, Shobdon, Hereford; Mrs W. F. Inge, Thorpe Hall, Tamworth; K. W. Milnes, The Field, Hampton Bishop, Herefordshire; John Minton, Dryton, Wroxeter, Salop; E. Nock, Harrington Hall, Shifnal; N. J. Nunnerley, Tern Hill, Market Drayton; C. T. Pulley, Lower Eaton, Hereford; Lt.-Col. H. P. Sykes, Longford Hall, Newport, Salop; E. C. Tanner, Eyton-on-Severn, near Shrewsbury.

Shepherds' Calendar of Ashlyns Hall flock of Shropshire ewes belonging to Sir Richard Cooper, Bart., of Birkhamsted:—

August.—The work of the year begins with the close examination of the flock and the removal of the faulty ewes, if any remain so late in the season. The flock is made up to its numerical strength of 200 by selected shearling ewes, which are numbered in large figures (3-inch), so that they can be readily identified. All ewes are selected and apportioned to the different sires, which are allowed to run with them, excepting show rams in high condition. In that case, the ewes are accompanied by a "teaser," and all, in turn, taken to the selected sire. Meanwhile, the ewes run over the stubbles, and are as often as possible changed to fresh pasture to keep them improving in condition.

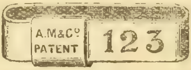

Fig. 79.—Patent Locking Ear-tag.

September.—In this month the greatest proportion of the ewes is served by the rams. During the first few weeks a mark is placed on the ewes served, at the end of each week, so that the ewes can be drawn into the lambing-pen weekly in order of service. Special attention, including drenching, is necessary to prevent lung or throat worms among the lambs.

October.—The shearling ewes are put to the ram early in October, so that they may lamb a little later than the older sheep, and in better spring weather. The rams are generally withdrawn at the end of October (although the rule is not absolute), and winter dipping follows.

November and December.—The ewes are allowed to run on the grass with, when necessary, an allowance of hay, and as far away from the lambing-pens as possible, until they are well advanced in lamb, when they are brought nearer home, and a little dry artificial food is given, say $\frac{1}{4}$ lb. each, gradually increasing to 1 lb. per day.

January and February.—Lambing begins about 8th January, and closes (except in shearling ewes) about the end of February. The greatest number of lambs come in the latter month. All are registered within a week by notch marks in the ears. The number is entered into the private Flock Book against the entry of the dam, and a distinguishing number with paint is placed on each to correspond with a similar number on its sire.

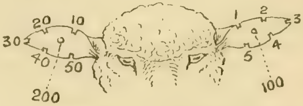

Fig. 80.—System of Notching the Ears.

When the figures required are above 5 or 50, two cuts are made, *e.g.*, for 79 cut 50 and 20 on the off ear, and 5 and 4 on the near ear. A hole in the centre of both ears denotes 300.

Lambs at a week or ten days old are drafted to the adjoining fields by day and taken into open sheds at night, to harden them off until they are fit to lie night and day in the fields, probably with the shelter of some protection cloths round hurdles. Meanwhile the ewes are well fed on artificial food, and as much kale, swedes, and hay as they can eat; the lambs running in front, and getting crushed oats and linseed cake. A plentiful supply of rock salt is put within reach of all.

April.—Liberal feeding continues, but is varied by the substitution of mangels, kale, rye, and clover seeds about the middle of the month. The one-year-old rams for show purposes are early shorn, and shearing the ewe flock may be begun in the last week of April.

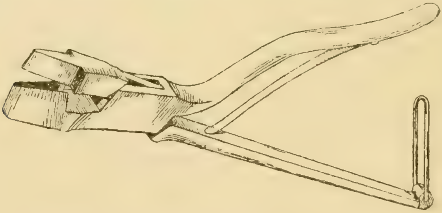

Fig. 81.—Fine-pointed Nippers for Notching the Ears of Lambs.

May.—The general shearing is completed early in the month, and at the same time the unshorn lambs are dipped. Each lamb is given one of Cooper's tablets, made of compressed sulphur-arsenic dip material, as a precaution against parasitic worms in the alimentary canal—the lambs being fasted over night, and for an hour afterwards. It may be necessary to repeat the dose every month or six weeks until November.

June.—The summer dipping of the whole flock is carried out towards the end of June. The lambs are also weaned, and the ewes placed on the worst pasture, as far from the lambs as possible, until August, with little attention, in the hope that they may lose excess of condition.

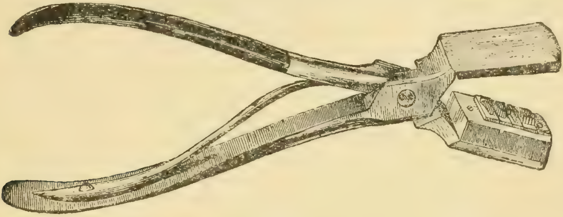

FIG. 82.—TATTOOING IRON, CALLED A "TATTOOER."

The Dorset Down, or **West Country Down** breed,[1] was brought into prominence outside its county area by the formation of a Dorset Down Sheep Society in November 1904, about eighty years after the modern type of the breed was established. The breed is also called the "Improved Hampshire." It is "a middle type of Down sheep pre-eminently suited to Dorsetshire," originally formed by breeding Southdown rams to Hampshire ewes, and using the rams from the flocks thus formed to improve the original Down sheep of the west, which it is claimed trace back for a very long time before the Hampshire Down breed was established. Two names are specially mentioned in connection with the work of improvement, viz. (1) Thomas Homer Saunders, of Watercombe, near Dorchester (followed in his work by his son, Thomas Chapman Saunders); and (2) Humfrey, of Chaddleworth, near Newbury. Humfrey selected rams from the celebrated flock of Jonas Webb; and Saunders, selecting his rams from Northeast's flock, carried off nearly all the prizes in the "Short-wooled other than Southdown" classes at the Royal Shows of Chester in 1858, and Warwick in 1859. Since that time, when the "Western County Downs" acquired a high reputation, rams from these flocks have been extensively used to refine many of the flocks of Hampshire and Wiltshire. And Dorsetshire breeders have gone to the leading flocks thus improved for requisite changes of blood, "with the result [says the *Flock Book*] that the Dorset Down breed now registered, although of finer bone and often of lighter colour, are closely related to, and possess the principal features of, the Hampshire Down type, modified by local conditions."

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[1] Indebtedness is acknowledged to the preface to vol. i. of the *Dorset Down Flock Book*, and to a speech by Henry Duke reported in the *Dorset County Chronicle* of 24th November 1904.

"A good type of Dorset Down should be free from all coarseness, the chief points being a rather long, full, clean face and under-jaw, with a bold, bright eye, and full muzzle; the ears should be fairly long, thin, pointed, whole-coloured, and carried well above the level of the eyes; the neck strong and well set on. The animal should be fairly fine-boned, and covered with a close, fine fleece going well down to the hocks and knees, round the cheeks, between the ears and on the forehead; but wool under the eyes, or across the bridge of the nose, on the ears, or below the hocks and knees is to be avoided. It is desirable that the face, ears, and legs should be of a dark brown colour. The Dorset Down should embody the good points common to all breeds of sheep, but should be especially good through the heart and behind the shoulder; it should also have a well let-down and rounded leg, and, whilst not standing too short, there should be no tendency to legginess."

It is claimed that the Dorset Down is a rent-paying type, which, stocked thick on the ground, produces the small mutton of the finest quality sought for in the best markets, viz., from 66 to 72 lb. at eight to nine months old, or from 40 to 48 lb. as sucking lamb at ten to twelve weeks old: and that they are equally at home between hurdles, and spread over the ewe-lease upon which the Dorset flocks are kept six or eight months of the year. In comparing Hampshires and Dorset Downs, it has been stated that 120 Dorsets could be bred and kept in place of 100 Hampshires; that the Hampshire butchers' teg would weigh 9½ stones (of 8 lb.), or 19 lb. a quarter, against the Dorset 8½ stones, or 17 lb. a quarter; and that the Dorset Down fleece often averages 5 to 5½ lb., or rather more than the average Hampshire flock, and fetches 1d. a lb. more at sale. It is estimated that there are about 100,000 Dorset Down breeding ewes in the country, and about 40,000 of these were entered in the first volume of the *Flock Book* —a fact which demonstrates how quickly and widely a knowledge of the value of registration is spreading in this country.

The following are prominent breeders:—G. Bissell, Rockhampton, Dorchester; T. E. Caines, Renscombe, Corfe Castle; Mrs Chilcott, Lewell, Dorchester; Messrs Coleman, Tarrant Keynston, Blandford; E. R. Cox, Purse Caundle, Sherborne; Major A. V. Hambro, Milton Abbas, Blandford; Sir Everard Hambro, K.C.V.O., Milton Abbey, Blandford; Edward J. Hiscock, Milborne Wick, Sherborne; T. S. Hooper, Winfrith Newburgh, Dorchester; F. Hounsell, Winterborne Kingston, Blandford;

The Rt. Hon. the Earl of Ilchester, Melbury, Dorchester; Messrs H. R. Jesty & Son, Bere Regis, Wareham; W. W. Lovelace, Piddlehinton, Dorchester; R. R. Mead, Volis, Kingston, Taunton; W. B. Norton, Milborne St Andrew, Blandford; P. and C. Seward, Weston, Petersfield, Hants; James Spicer, Bovington, Wool, Wareham; T. R. Spiller, Luccombe, Milton Abbas, Blandford; A. O. Symes, Kingston Russell, Dorchester; J. O. Symes, Swyre, Dorchester; Captain Thistlethwayte, Southwick, Fareham, Hants; Mrs Tory, Turnworth, Blandford; Clement E. Tory, Newton Peverell, Sturminster Marshall, Dorset; James G. Tory, Whitechurch, Blandford; Randolph Tory, East Farm, Whitechurch, Blandford; Colonel Sir Robert William, Bart., Bridehead, Dorchester.

The Hampshire Down sheep, says the preface to the first volume of the *Flock Book* published by the Hampshire Down Sheep Breeders' Association in 1890, "undoubtedly dates its origin from the crossing of the old Wiltshire horned sheep and the old Berkshire knot with the Southdowns, which were introduced into Wiltshire and Hampshire early in the nineteenth century." The first results were different types of large, coarse sheep in different districts. In north and east Hampshire the breed was dark brown, almost black on the face and ears; with Roman nose, greatly developed neck muscles, and large leg bones, a tendency to the production of "snig horns," or loose scurs, and wool growing below the hocks and knees, with only an occasional white spot on the hair-covered surface. In Wiltshire a larger-framed and less symmetrical animal, often with speckled faces and ears, was produced. It was the genius of Humfrey, of Oak Ash and Chaddleworth, near Newbury, that conceived and guided the process of unifying and refining the various types by introducing Sussex or Southdown blood—a work which also benefited the Dorset Down breed, as shown on p. 681. The modern Hampshire occupies a large area in the counties of Berks, Hants, Wilts, and Dorset, "while many pure flocks exist in Gloucestershire, Somerset, Surrey, Sussex, Kent, Herts, Warwick, Oxford, Yorks, Cambridge, Essex, Norfolk, Bedford, and the Midlands generally." One feature of the breed is that it is "adapted for the high-lying and barren uplands of the chalk, where holdings are exceptionally large, and flocks number from 500 and upwards." The general run of flocks is seldom under 300, and in vol. xxxii. of the *Flock Book* the registered flocks numbered 397.

Prior to 1861 the Royal Agricultural Society of England recognised only four classes of sheep: (1) Leicesters; (2) Long-wool, not Leicesters; (3) Southdowns; (4) Short-wooled sheep, not Southdowns. An addition to the list was announced in 1861, of Hampshire Downs, Lincolns, Cotswolds, Dorset Horns, Oxford Downs, Romney Marsh, Mountain, and Irish Long-wooled breeds.

The Hampshire is larger, coarser-looking, squarer, and lower-set than the Shropshire, and when young not easily fed to "handle fat," though often forced to great weights by high feeding. Ewes on good land are frequently allowed 1 lb. each per day of a mixture of equal parts of linseed cake and peas or cracked Egyptian beans, until the lambs begin to eat; then it is gradually taken from the ewes and given to the lambs. With abundance of natural food in addition to the concentrated mixture, a ram lamb may increase from 19 lb. at dropping in January to 150 lb. live-weight on 1st August. It is a common and successful practice to put them to the ewes at about seven months old, and sometimes as early as in July. Lambs can be got early, as the ewes come in season sooner than most other sheep. Ewes are generally cast in early autumn at four and a half years old, after rearing the third crop of lambs. Ewe lambs can be put to the ram to produce lambs at one year old, but the practice is not to be encouraged. "A well-bred **fattening lamb** on good keep will increase at the rate of $\frac{3}{4}$ lb. per day from birth, and will weigh 113 lb. on 31st May." Of this, 68 lb. or 60 per cent. will be dressed carcase, or 17 lb. per quarter. The great success of the Hampshire in competition with other breeds at Smithfield (see the annual official reports) is partially due to the advantage of early birth. The mutton is of fine quality, not so fat as that of the long-wool breeds, and all over firm to the touch.

Points Showing Standard of Excellence.

The *Head*—Face and ears of a rich dark brown—approaching to black, well covered with wool over the poll and forehead. Intelligent, bright, full eye. Ears well set on, fairly long and slightly curved. In rams, a bold masculine head is essential. The *Neck* of strong muscular growth, not too long, and well placed on gradually sloping and closely fitting shoulders. The *Carcase* deep and symmetrical. The *Legs* strongly jointed and powerful, of the same colour as the face, and set well apart; the hocks and knees straight. The *Feet* sound and short in the hoof. The *Wool* white, of moderate length, close and fine texture, extending over the forehead and belly, and over the scrotum of rams. The *Skin* pink and flexible.

Objections.—"Snigs"; white specks on face, ears, and legs; thick, coarse ears; black wool; coarse wool on breeches; protruding underjaw; excessive loose skin under neck.

December 31st in each year was definitely fixed in 1913 as the last day on which entries of any kind for the *Flock Book* can be received.

The average weight of fleece is $4\frac{1}{2}$ to 5 lb. for ewes. The ears are larger and more pointed than in the Southdown. The fore-quarters are particularly good, and the top of the shoulder exceptionally broad. A conspicuous defect at one time prevalent in ordinary specimens of the breed was a want of girth and slackness behind the shoulder, but this has been bred out.

Among **prominent breeders** of Hampshire sheep are to be found the following:—James Herbert Benyon, Englefield House, Reading, Berks; H. W. Bishop, Pendley Stock Farms, Tring, Herts; J. Flower, Chilmark, Salisbury; J. Goldsmith, Blendworth, Horndean, Hants; The Hon. Lady Hulse, Breamore House, Hants; Mrs Beatrice A. L. Jervoise, Herriard Park, Basingstoke, Hants; Major J. A. Morrison, D.S.O., Basildon Park Reading, Berks; George Philippi, Crawley Court, Winchester, Hants; Viginti Tertius Thompson, Norton Manor, Sutton Scotney, Hants; The Trustees of Lord Wandsworth, Agricultural College, Long Sutton, Winchfield, Hants; George Caines Waters, Burcombe, Salisbury; James White, Foxhill Estate, Wanborough, Wilts.

The Suffolk sheep was formed towards the close of the eighteenth century and in the first half of last century, by crossing ewes of the hardy Blackface Norfolk Horned breed (see Plate CLXXII. and p. 621) with Southdown rams, to give symmetry of form, compactness, and early maturity. The general interbreeding of these two distinct strains of blood is described by W. and H. Raynbird, of Hengrave, in an *Essay on the Agriculture of Norfolk*, written for the Royal Agricultural Society in 1847.[1] About this time they were known as "Southdown Norfolks," and locally as "Blackfaces." It was not till 1859 that they were designated "Suffolks," when classes were provided for them at the Suffolk Agricultural Association's meeting. Among early breeders, George Dobito, of Lidgate, Suffolk, took the leading part in establishing the Suffolk as a distinct breed, soon after 1850. Other noted ram-breeders were—J. Walker, of Loudham Hall, Suffolk (1830); J. M. Green, of Stradishall, Suffolk (1850); Peter Portway, of Sampford, Essex (1850); George Kent, of Gazeley, Suffolk (1860); and General Hall, of Six Mile Bottom, Cambridge (1850). The breed is mentioned by Arthur Young in *The General View of the Agriculture of Suffolk* as far back as 1797. Some pure-bred flocks of the present day date back to 1790, which throws light upon the fact that recent attempts at the importation of foreign blood into the breed have not proved successful. Those in the eastern districts partake strongly of the old Norfolk characteristics, viz., dark face, light bone, and active habits. Those to the west are, as a rule, kept on better land; they have lighter faces and greater aptitude to fatten, and grow to greater weights.

The Suffolk breed was recognised by granting it classes at the Royal Agricultural Society's Show in 1886, when the **Suffolk Sheep Society** was established. Since that time it has made rapid progress. "Under the certificate of the Board of Trade, dated 17th July 1891, the Society's mark—a lozenge, with or without a letter 'S,' supported by two shepherd's crooks crossed—was duly registered, and by order of the Council, 'sheep lambed subsequently to 1890 will not be registered as pure-bred Suffolk sheep unless they bear the registered mark of the Society and the breeder's registered flock number tattooed inside the *left ear.*' A subsequent order provides that rams shall bear their individual registered number tattooed inside the *right ear.*" Flocks are inspected prior to registration, and re-inspected every fourth year.

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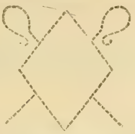
[1] Historical statements of the "genesis" of the breed of Suffolk sheep, with a summary of its unprecedented successes at carcase competitions, were issued in 1905 by Ernest Prentice (late Secretary and Editor), 64 Orford Street, Ipswich, as a preface to the *List of Members of the Suffolk Sheep Society*. He also wrote two articles on the breed for the *Highland Society's Transactions*, vol. x., p. 96 (1898), and vol. xxxii., p. 127 (1920).



Tattooed in Left Ear, and followed by the Registered Number of the Flock.

Fig. 83.

The following are the **distinguishing points** of the breed adopted by the Society:—*Head*, hornless; face black and long, and muzzle moderately fine—especially in ewes (a small quantity of clean, white wool on the forehead not objected to). *Ears*, a medium length, black, and of fine texture. *Eyes*, bright and full. *Neck*, moderate length, and well set (in rams stronger, with a good crest). *Legs* and *feet* straight and black, with fine and flat bone; wooled to knees and to hocks, clean below. Fore legs set well apart. Hind legs well filled with mutton. *Belly* (also *scrotum* of ram), well covered with wool. *Fleece*, moderately short: close, fine fibre, without tendency to mat or felt together, and well defined, *i.e.*, white, not shading off into dark wool or hair. The new-born lamb has a uniform grimy colour all over the tips of the wool, not patchy like the lambs of the old Norfolk breed, due to patches of black or blue skin growing black wool. *Skin*, fine, soft, and coloured pink.

It is claimed for the **Suffolk breed** that it **excels** in the following particulars:—in *activity* of movement, in gay, alert *carriage*, and high *courage;* in *fecundity*, to the extent of producing over thirty lambs to the score of ewes (the average of lambs reared in registered flocks for the past thirty-four years was 132·95 per 100); in *early maturity*, as the ram lambs are so large and well developed that they are usually preferred for breeding purposes to older sheep; in *hardiness*, as the breed has not been pampered, and will find a living on bare pastures where most other breeds would starve. The *mutton* is very fine, possessing an exceptionally large proportion of lean meat. It commands the highest prices in the market. The wool is of the best type of medium down and noted for "pure whiteness, fineness, elasticity, and strength,"—averaging from ewe flocks from 5·5 to 6 lb. washed. The *constitution* is unusually robust and hardy, the animals possessing great power of endurance when driven long distances. Their being almost exempt from foot-rot has raised their reputation as good "rent-payers," and has led to the displacement of a good many "half-breds," at one time largely kept in the marsh-land districts.

Before the war Suffolk ewes and rams had been **exported** to the Colonies, and to Austria, Denmark, Finland, France, Germany, Russia, Spain, Switzerland, and North and South America. In January 1893, the "American-Suffolk Flock Registry Association" was incorporated.—(Secretary, G. W. FRANKLIN, Atlantic, Iowa.)

The **Suffolk ram** crosses admirably with all white-faced ewes, producing a black-and-white speckle-faced lamb, and a carcase full of lean meat. No other British breed of sheep can produce a saddle-cut of mutton with such wealth of lean red meat in proportion to fat as the Suffolk and the Old Norfolk breeds. In experiments with **Merino ewes** at the Colonial College, Hollesley Bay, in 1894-96, the progeny by a Suffolk ram at fifteen months old averaged 94 lb. live-weight, and yielded 60·64 per cent. of dressed meat of "excellent quality, fine in grain, and of good flavour, with a large proportion of lean." The Suffolk-Merino wool, 7½ lb. to the fleece, was "most excellent of its kind, with a 'soft handle,' and withal quite firm in staple."

For the mutton export trade in South Africa, the Suffolk ram on ewes of the little black-headed **Persian** breed from Somaliland, is most promising.

At the **International Live Stock Show** at Chicago (22nd November to 5th December 1903), the first prize in the dressed carcase competition went to a Suffolk wether exhibited by Wisconsin Experiment Station.

At the **Smithfield Club Shows** in the carcase competition or "block test" open to all breeds, Suffolks and Suffolk crosses have carried off half the championships and reserves for championship. Suffolk lambs have won since 1900 two-thirds of the prizes in the Short-wool lamb class, and Suffolks crossed with ten different beeds have gained since 1900 half the total awards in the cross-bred classes.

In 1921, Suffolk lambs ten months old, weighing 668 lb. per pen of three, won the Prince of Wales Challenge Cup for best sheep or lambs in competition with all breeds at the live section of the Smithfield Show. In the cross-bred carcase classes, Suffolk-Cheviots all but swept the board, winning first, third, and fourth prizes for lambs, and first, second, third, and fourth prizes for wethers.

In 1920, some flocks were debarred from showing owing to foot-and-mouth disease restrictions, but outstanding facts are worth recording:—(*a*) In the live section the heaviest pen of three Suffolk lambs weighed 5 cwts. 3 qr. 10 lb., and this was heavier than any other pen of lambs in the show, heavier even than the wethers of any short-wooled breed except one, and 59 lb. heavier than the champion pen, which were wethers. (*b*) The percentage of dressed carcase to live-weight of the Suffolk lambs was 58·41, and the best lamb gave 61·69 per cent. (*c*) Suffolk crosses won six out of eight awards in the cross-bred classes.

Ten years' average, 1909-1920. (Under 12 months old.)

	Live-Weight.	Carcase Weight.	Fat.	Pluck.	Skin.	Carcase to Live-Weight.
Suffolk Wether Lambs	142·74	82·51	8·13	4·60	13·08	57·80

The most successful cross has been that between the Suffolk ram and large-framed Cheviot ewes from Sutherlandshire, brought into prominence by Charles T. A. Robertson, and bred by him at Little Horringer Hall, Bury St Edmunds. He began selling weekly drafts in the middle of October at eight months old. The bareness and consequently unprotected condition at birth of the Suffolk-Cheviot prevents its extension to hill pastures.

Suffolk-Cheviot Carcases at Smithfield Show, 1915.

	Live-Weight.	Carcase less Head and Feet.	Carcase to Live-Weight.
Lambs under 1 year (Reserve Champion).	140	77	55·00
Wethers under 2 years, 1st Prize . .	172	104	60·47
,, ,, 2nd Prize . .	145	82	56·55
,, ,, 3rd Prize . .	144	80	55·56

At the **Scottish National Fat Stock Show**, Suffolk-Border Leicesters won the championship in 1919, and were reserve for championship in 1920. Suffolks and Suffolk crosses have won the championship eight times and reserve for championship seven times at this show.

In 1921, a strong class of 3 pure Suffolk and 36 Suffolk Border Leicester lambs averaged 205·5 lb. live-weight.

Under good ordinary management in the Border country, Suffolk rams put to Caithness half-bred ewes get about 9 lambs from 5 ewes. The Down-cross ewes are not only exceptionally prolific and grand milkers but they have hardier constitutions than three-quarter breds. They are big sheep, feeding up to 100 or 120 lb.; as wild as hawks if startled or frightened. They are tupped at eighteen months old and after producing three crops of lambs are sold at four years old. The best lambs when fed till April and sold off the shears, weigh 19 to 20 lb. per quarter—if forced for Christmas, 16 lb. The ewes clip about 7 lb. of washed wool, which is generally easier sold than half-bred wool and at a shade higher price. Young Down rams get lambs with darker faces than old ones. Half of the flock are said to incline to the half-bred and half to the Suffolk in character of wool. On the gimmers the Leicester Oxford cross tup is used and afterwards the Oxford Down. A ewe that has only one lamb the first time is liable to neglect one of her lambs next year, a result of the influence of the wild nature from the Norfolk-horned breed. These variety crosses were introduced on ground which up to the beginning of this century had been occupied by half-bred flocks which were put to half-bred rams, but were upset by "scrapie" (see p. 747). Flocks which had been half-bred for a hundred years had to go. "Scrapie" appears among Leicesters and Cheviots, and other hybrids besides the half-bred, but not in black-faces. It has been known to break out in half-breds from Caithness ewes while it had not occurred among either of the pure parent flocks. Half-bred hoggs which from their breeding would surely have died on the farm in Scotland within four years, have been known to live and show no trace of the disease when taken to Gloucestershire. The second cross by the Suffolk ram on a half bred ewe is generally dark faced, many being mahogany brown.

"Up to 1914 three-quarters of the registered flocks were in Suffolk and Essex. The number of **new flocks** (170) registered in the four years, 1917-1920, constitutes a record. There are now (1921) 273 registered flocks in fifty-four counties, widely scattered over the British Isles—including thirteen Irish counties. The number of small flocks, consisting of as few as from 3 to 50 ewes (viz., 81), shows that it pays to grow Suffolks on a small scale."

In 1910 one flock of Suffolks existed in Northumberland; ten years later in the belt of country between the Tay and the Tees there were 27 registered flocks.

H. G. Robinson, "at Northumberland County Experiment Station, 1916-1917, found that the Suffolk cross lambs were not so big boned as the other crosses, but were much fatter and ready for market sooner."

Leading Breeders:—*In England*—Chivers & Sons, Ltd., Histon, Cambridge; J. W. and F. D. Eagle, Walton-on-Naze; D. Abbott Green, East Donyland Hall, Essex; J. R. Keeble, Brantham Hall, Manningtree; the late S. R. Sherwood, Playford, Ipswich; H. E. Smith, Walton Grange, Suffolk. *In Scotland*—G. B. Shields, Dolphingstone, Tranent; J. P. Ross-Taylor, Mungoswalls, Duns; the late William Ford, Fentonbarns, East Lothian. [No one did more to introduce and to popularise the breed. Among many other prizes he gained the sheep championship of the Scottish National Fat Stock Club in Edinburgh in 1898, with a pen of Suffolk wethers, and the reserve numbers in 1899 and 1900, with pens of

Suffolk half-bred wethers.] *In Ireland*—H. S. Gill, Yeomanstown, Naas, Co. Kildare; J. M'S. M'Culloch, Gerrardstown, Donabate, Co. Dublin.

Expert Buyers for the Society:—J. H. Dawson, Nacton, Ipswich; J. R. Grimsey, Leiston, Suffolk; W. W. Hope, Linton Lodge, Prestonkirk, N.B.

The **Oxford Down** breed was **originated** about 1830, by the crossing of Cotswold rams with improved Hampshire ewes, and in a few cases with Southdown ewes. The aim, said Pusey, was to secure "the superior quality, and therefore higher price *per pound*, of the mutton as compared with long-wooled sheep, and the superior weight of wool and of mutton as compared with short-wooled sheep." The **accredited originators** of the idea lived near Witney, and seem to have acted independently. They were—Samuel Druce, of Eynsham; John Gillett, of Brize Norton; William Gillett, of Southleigh; and Nathaniel Blake, of Stanton Harcourt. They were speedily joined—if they were not preceded—by J. T. Twynam, of Whitchurch Farm, Hampshire, and by John Hitchman, of Little Milton. The breed was **first named** "Down-Cotswolds," changed about 1857 to "Oxfordshire Downs," and shortened in recent years to Oxford Downs. Clare Sewell Read referred to them in the *R. A. S. E. Journal* for 1854, "as the glory of the country—the most profitable sheep to the producer, the butcher, and the consumer." It is the largest Down, although, as is shown by the Smithfield weights, the Suffolk is at least equal when forced. The breed has been since the early fifties of the nineteenth century a frequent winner of prizes in competition with other breeds at the Royal, the Smithfield, and other leading shows. Their honours include the Smithfield fifty-guinea cup for the best pen of sheep in the shows of 1872, 1875, and 1887.

The most **famous ram**, which stamped his characteristics on the breed, as "Hubback" did among Shorthorns, was "Freeland," bred by A. F. Milton Druce. He was hired for the season 1875 by John Tredwell, Upper Winchendon, Aylesbury, and the following year sent to the States, "where he won the championship of the sheep classes at the Philadelphia Centennial Exhibition." America early showed its appreciation of the breed, as an Association for the publication of an *Oxford Down Record* has existed in America since 1881. Vol. i. of the English *Oxford Down Flock Book* did not appear till 1889, the Oxford Down Sheep Breeders' Association having been formed in 1888 at the Annual Oxford Ram Fair, held on the first Wednesday of August.

The **distinguishing characteristics** of the ram are officially given as follows:—"He has a bold, masculine head well set on a strong neck, with poll covered with wool and adorned by a top knot. The face is a uniform dark-brown colour, eyes prominent, ears of good length, shoulder broad, with broad breast well forward, a full level back; barrel deep, thick and long, with straight underline. Legs are short, dark coloured (not spotted), and should stand square and well apart; the mutton is firm, lean, and of excellent quality." The wool ought to be classed as long-wool as it is longer than that of other Down sheep and therefore of greater weight. Fleeces of ewes in good flocks average 7 to 8 lb. each, although perhaps the texture is not quite so fine. This latter defect is rapidly being improved and greater density secured.

Flocks of cross ewes are sometimes kept for breeding fattening tegs. When they become light-faced, after frequent crossing with the Cotswold, a pure Hampshire ram is turned in for a year; and when they are rather dark, a Cotswold is used in preference. A Shropshire ram on such a cross ewe produces a sheep with a better covering of flesh along the back than the Oxford Down will do.

Oxford Down rams were **first introduced** into the Border district of **Scotland** by the late Walter Elliott, of Hollybush, Galashiels, about 1867, and in 1885 he wrote to the Author: "This year there would be about 100 rams sold at Kelso, and I consider them the most useful sheep introduced into our country of late years." For a number of years they were put to Cheviot and Scotch Blackface ewes, and their use had almost been given up when it gradually became realised that they have no equal in producing crosses for hogging by the Leicester-Cheviot ewes, and that they also cross well with Border Leicester ewes. The Oxfords are put to the older ewes, *not* to theaves, as there would be too many losses in lambing. The Border Leicester, Wensleydale, and *now* very often the Suffolk, are put to the theaves and young ewes, and then the Oxford, which produces a big sheep. The cross progeny of the Oxford ram is slower in reaching maturity than the progeny of the Border Leicester, but it can be fed to greater weights in spring, 65 to 68 lb. per carcase, without becoming too fat to be classed as finest quality.

The following **tables of figures** (from the *Kelso Chronicle*), giving the **numbers of rams** exposed since 1899 at the sale held annually under the auspices of the **Border Union Society** at Kelso (*Secretary*, John Scott, Jedneuk, Jedburgh) on the second Friday of September, show the very important position the breed occupies in the Southern counties of Scotland, and also how it has gradually assumed a front-rank place alongside the Border Leicester for crossing purposes. The special merit of the Oxford Down cross is the larger proportion of lean mutton to fat than is given by the progeny of the pure Border Leicester ram.

ENTRIES OF RAMS FOR SALES.

TABLE I.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
Border Leicesters .	1186	893	871	953	938	927	988	960
Half-breds (Leicester-Cheviots) . .	359	350	332	374	341	343	325	368
Downs (mostly Oxfords) . . .	620	461	648	651	705	779	1071	*1051
Totals . .	2165	1704	1851	1978	1984	2049	2384	2379

* Of Downs in 1906 there were 62 Suffolks, 55 Hampshires, and the others were Oxfords.

TABLE II.

	Border Leicesters.	Half-Breds.	Oxford Downs.	Suffolk Downs.	Other Downs.	Grand Total.
1907 . .	998	378	1149	83	68†	...
1908 . .	1090	394	1078	32	20†	...
1909 . .	1003	331	980	44	...	...
1910 . .	1038	383	917	109	10†	...
1911 . .	1230	485	784	85	10‡	...
1912* . .	842	360	199	37	30‡	...
1913 . .	1053	333	805	175	35‡	...
1914 . .	979	287	1055	343	8‡	...
1915 . .	931	213	1054	432	10‡	...
1916 . .	828	293	1117	465	...	...
1917 . .	858	232	1140	435	...	...
1918 . .	813	229	1041	396	...	...
1919 . .	915	274	1152	428	...	...
1920 . .	817	200	1150	428	62§	2657
1921 . .	844	245	1486	522	36‖	3133
1922 . .	839	184	1283	391	10‖	2707

* No sheep from England owing to foot-and-mouth disease. † Hampshires.
‡ Shropshires. § Including 12 Lincoln Long-wools. ‖ Including Cotswolds and others.

Amongst the **well-known breeders** in the home counties whose names usually appear at the prominent shows are:—J. R. Akerman of Grafton Clanfield; H. Akers & Co., Black Bourton, Clanfield; Capt. R. B. Brassey of Heythrop, Chipping Norton; W. H. Hitch of Elkstone, Cheltenham; R. W. Hobbs & Sons, Kelmscott, Lechlade; The Duke of Marlborough, Blenheim Palace; F. Penson of Taston, Charlbury; W. J. P. Reading & Son, Langford, Lechlade; H. W. Stilgoe, Adderbury, Banbury. Of the **Scottish breeders**:—Robert Graham of Kaimflat, Kelso; J. Robertson of Ladyrig, Kelso; and T. and M. Templeton, Sandyknowes, Kelso, take the chief prizes at the Highland Show, and their sheep realise very high prices at Kelso sales. The number of flocks in the Lothians has increased rapidly in recent years.

CHAPTER XXXI

MANAGEMENT OF SHEEP ON ARABLE LAND AND LOW-COUNTRY PASTURE—THE EWE AND LAMB

"Tupping" Time — Effect of "Flushing" — Winter Pasture — Prolific Tendency—Ewes not in Lamb—The Lambing-Pen—Poisonous Plants —Parturition and Associated Dangers—Early Treatment of the Lamb —Food of the Ewe—Lambs' Food—Castration—Tetanus—Marshall's Work on the Filiform Appendage—Washing—Shearing by Hand and by Machinery—Weaning.

THE breeding season or "**tupping**" **time** begins usually, where the climate is moderate, about the first week of September, or at any later period, varying with the district, till about 22nd November (Martinmas), when hill rams go out to the ewes. Hampshires will tup in the beginning of August, whereas mountain ewes frequently do not begin to stand to the ram before the end of October. Cast ewes (four-year-old) and "culls," or those unfit for breeding, are "drawn" out when the lambs are weaned, or at any more convenient time before the ram is put amongst them.

By turning ewes on to good food, such as rape or mustard, for ten days before tupping time, they get into an improving condition, and in consequence produce more doubles. If the green food cannot be had, give each of them ½ lb. of oats daily. The effect produced by this "**flushing**" or artificially stimulating ewes shortly before and during tupping time, is dealt with by Dr Francis H. A. Marshall in a paper published in the *Proceedings* of the Royal Society (London), (1905). The conclusions reached in this paper are based upon statistics collected in the year 1904-5 by the Highland and Agricultural Society, for Scotch Blackface, Cheviot, Border Leicester, and half-bred ewes. It is shown that the percentage of lambs produced was as a rule very appreciably greater among those flocks which underwent a process of flushing, and that the percentage of barren ewes in those flocks was generally less than the average. Conversely, the occurrence of a snow-storm, or the loss of a good field of pasture from the run of a flock during tupping time, will correspond with the reduction of twins next lambing season. The condition of the ewe, not that of the ram, seems to be all-powerful in controlling the number of doubles. Only when the environment is favourable can the hereditary tendency to be prolific —which has been noticed in the ewes but not yet remarked in the ram—have any important influence.

Too much care cannot be exercised in arranging the ewes and rams according to their different qualities and characters, so that the flock may maintain a definite type of its own. One ram to sixty ewes is the usual proportion; but a "shed" tup may be allowed a greater number, even one hundred or more, if a "chaser" or "teaser" lamb, with a cloth sewed on his belly, be put out to find the ewes as they come in season. A ewe remains in use for about twenty-four hours. If not settled, ewes "come back" to the ram at the end of thirteen to eighteen (usually sixteen) days. The mechanical way of finding out when a ewe has been tupped is to smear the breast, or sometimes the inside of one fore leg of the ram with paint. Red is usually chosen and followed by blue and black. The ewe is thus marked on the rump when she is tupped, and all those so marked in any particular week are "keiled," or marked with a distinguishing colour. At the sixteenth and again at the thirty-second day the colour of paint on the ram is changed, so that those ewes which "come back" can be at once distinguished from those tupped for the first time. A ewe marked twice should be put to another ram for a third trial, as she is less likely to hold to the first ram than to another. Barrenness is most easily avoided by running several lots of ewes with the accompanying rams together. At the end of six weeks, when the tups are taken up, ewes run over stubbles and poor pasture, or follow fattening sheep to pick up what remains of turnips or other rejected food: they should be kept thriving, but must not be made too fat.

Ewes on pasture during winter may be given an allowance of $\frac{1}{2}$ ton of roots per hundred per day till lambing begins; and after they have lambed, 1 ton per day, or 22·4 lb. each, along with 1 or 2 lb. of hay or good oat straw in racks. The amounts should be slightly increased if snow covers the ground. Breeding ewes should not be folded on roots continuously during the later stages of gestation, as the excessive quantity of roots then eaten by the ewes frequently causes the lambs to be weak and unhealthy. Ten days before lambing begins each ewe should have $\frac{1}{2}$ lb. daily of a mixture of concentrated artificial food—such as crushed peas, Egyptian beans, and cake, with oats (whole), and bran, varying in relative proportion to one another, and also in quantity, to suit the condition of the bowels. Heavy milking ewes, like those with double lambs, should have this concentrated food increased, but not to more than 1 lb. each per day. The mixture is gradually reduced as the lambs learn to eat and become less dependent upon their mothers. Some farmers provide no extra food, and others give too much, and set it down to bad luck if the lambs do not thrive. It is a mistake to have breeding stock either too fat or too lean: they are then less prolific, and there is more risk of their producing small-sized young, and, moreover, they give less milk to support them. On an ordinary farm, twenty-five to thirty lambs per score of ewes is a good crop, the latter figure being more than an average. With extra care in management, and by breeding only from ewes which have been born twins, thirty-five, or, in the case of small and exceptionally successful flocks, even forty lambs per score may sometimes be got. The hereditary character of the **prolific tendency** in ewes is strong; for example, a cast Border Leicester ewe bred by Andrew and J. K. Smith, Leaston, East Lothian, had after 1895 never fewer than two lambs, sometimes three, and, during the last two years of her life, four at a birth. All her female progeny have invariably borne two or three lambs at a time. Five living lambs at one time is no very unusual event to find recorded in agricultural papers.

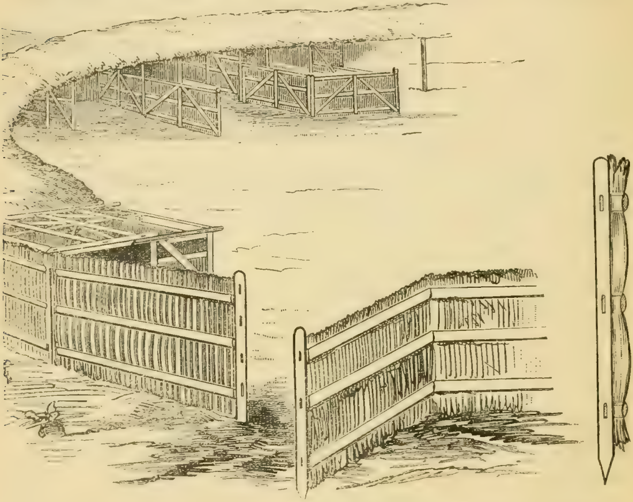
Ewes not in lamb (eild) may be noticed near to or during lambing time by the following signs:—

1. By their jumping and playing in good weather; 2. By being less bulky than the others in the region of the abdomen; 3. By no lamb being felt when the ewe is turned up, and the tips of the fingers pressed against the lower part of the belly; 4. By having no "show," or increase in the size of the udder; 5. By the appearance on the bare skin about the udder, of a considerable amount of yellow waxy excretion which does not look as if it would naturally clean off; and 6. By the wool near the udder being more firmly attached than the wool of a pregnant sheep.

The lambing-pen is an open, well-littered yard, often erected in a field of roots, on dry ground, with a southern exposure, in a sheltered place if possible, and on a slope sufficient to let surface water readily escape. It is constructed of hurdles thatched with straw to provide warmth and shelter for the young lambs in stormy weather. The walls may alternatively be made of two webs of sheep wire-netting (4-inch mesh) placed 6 inches apart, and packed with straw between. Small covered pens, each about 4½ feet square, are ranged round the north, east, and west sides, one such small pen being allowed to every six ewes that the enclosure is designed to contain.

Permanent lambing sheds of a more substantial nature exist on many farms, and are generally quite satisfactory. It is highly important in such cases, however, that there should be a thorough annual disinfection of the premises as soon as the lambing season is over, otherwise the germs of diseases may remain active from one year to another, with disastrous results.

Ewes "coming near their work" are brought in at night, so that they may be more carefully tended. Ewes do not lamb so frequently at night as late in the evening and early in the morning, and lambing is easier in moist than in dry weather. A shepherd who has a full herding requires the assistance of a skilled assistant or lambing herd, ordinarily for about a month, in the lambing season.



[*After a sketch by Commander M. J. Harrison, R.N.*

FIG. 84.—VIEW OF ONE SIDE OF A TEMPORARY LAMBING-PEN.

The period of gestation in ewes is between twenty-one and twenty-two weeks. The shepherd should live in a wooden house on wheels, fitted with a stove, and placed close to the pen, to enable him to give his undivided attention to the flock.

Rhododendron, laurel, ivy, and **azalea leaves** are a frequent cause of poisoning amongst "grit" ewes, brought near the homestead for lambing, if they get into the garden and browse on the leaves, or eat them through the fence, as they will do when green food is scarce and their pregnant condition gives them a ravenous appetite. "*The symptoms* are very acute: there is great tympany, laboured breathing, dullness, a green sputum runs from the nostrils and mouth, the animal is unable to stand, and will lie for several days with occasional fits of struggling, and death ensues if it is not treated with purgatives and stimulants. Even when the ewes recover, the lambs are invariably born dead." **Henbane** (*Hyoscyamus niger*) produces similar symptoms. A few cases are on record of sheep being poisoned by eating the leaves of **Foxglove** (*Digitalis*) when snow is upon the ground. Tannic acid is said to be an antidote; failing this, treat as usual for vegetable poisons (p. 283).

During parturition assistance by hand should never be given too soon. Should the head of the lamb protrude, immediate action is necessary to prevent death by strangulation. When parturition is normal the two fore legs appear first, then the head. A steady pull by the legs is usually successful help. In false presentations, large lambs require to be turned right round before they can be got away. Turning is most easily accomplished when the ewe is suspended by an assistant holding her by the hind legs. The hands, after washing with strong carbolic soap, should be smeared with carbolic oil, one part of pure carbolic (Gresser's or Calvert's, not the crude or brown form) to twenty of sweet oil. Half an ounce to one ounce of the mixture should be put into the vagina afterwards, to prevent inflammation (the result of injury, or of the presence of putrid matter, as when the lamb has been dead for some time), which induces "straining." **Inversion of the uterus** (commonly called the "lamb-bed," or in Gloucestershire the "wither" or "wether") is thus prevented. When protrusion occurs, the exposed part must be washed with tepid water cooled after boiling, and a wineglassful of laudanum per pint added, as cold water is liable to give pain, and, while the ewe is held up by the heels, pressed gently back into its proper position, with the hand held flat, care being taken not to pierce the organ with the fingers. The oil, in such a case, should have a few drops of laudanum added to help to soothe and to allay the irritation. To retain the uterus in its position, a 1-inch mesh net made of strong twine may be put on the top of the

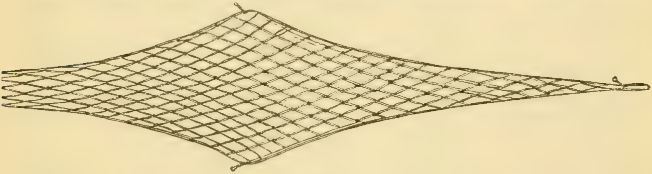


FIG. 85.—NET BREECHES FOR A EWE.

wool round the hips and covering the tail, the ends passing along the sides of the ewe, and terminating in fastenings to a rope tied round the heart-girth, after the fashion of the cow-breeches described at p. 366. If a net be not at hand, locks of wool can be tied tightly across from hip to hip, or the lips of the vulva may be stitched together. The last, though successful, seems a cruel and drastic remedy, but it should be remembered that while the womb protrudes the pain is acute and the life of the animal is in danger. The ewe should be separated from her lamb, kept quiet, and given a drench containing laudanum and whisky.

Inflammation after lambing, or septic metritis, is a fatal enzootic disease which occurs in sheep from three to twenty-four hours after lambing, and runs its course in three to eight days. Ewes which survive that period usually recover, but the lambs of those which suffer are liable to "joint-ill" or "navel-ill." Both are aggravated by, if they are not originally traceable to, the unclean state of the lambing-pen. "*The symptoms* are:—loss of appetite, high fever, constipation followed by diarrhœa, colicky pains, brown-coloured discharge from the vagina, coma, delirium, and death. *Treatment*:—Give a mild laxative, as 4 oz. of linseed oil with 1 oz. of turpentine, and follow with stimulants and sedatives, as sweet spirits of nitre and laudanum (2 teaspoonfuls of the former and one of the latter) in water every four hours, or whisky, a tablespoonful, and a teaspoonful of laudanum in milk, at the same interval. Irrigate the lamb-bed with a sedative and disinfectant lotion of Jeyes' fluid and tepid water, 1 teaspoonful to a pint, every four hours. Apply hot cloths to the loins. Separate and provide for the lamb independently. All litter from affected pens should be burnt, and the pen on no account used again. The rest of the ewes should be removed from the vicinity, especially those yet to lamb, and the attendant changed. The bodies of dead ewes must be deeply buried in quicklime, and the lambing-pens treated with quicklime also."

After-pains or **parturition fever** occurs especially in highly-fed or forced ewes that are penned on turnips and get little exercise. It may follow either easy or difficult lambing. "The **first indications** are seen two or three days after; the ewe, having a wild appearance, neglects her lamb, the urine is high coloured, there is frequent straining, and signs of pain when the loins are pressed. *Treatment*:—Anodyne enemas, as laudanum and warm water (a wineglassful to the pint); a purgative of Epsom salts or linseed oil, followed by stimulants (whisky) or sweet spirits of nitre, in doses as recommended under 'Inflammation after lambing.'"

Infectious Dysentery in Lambs.—Every spring since about 1910, flockmasters in Scotland and the North of England have suffered grievous loss from a fatal malady affecting lambs. The disease shows itself by a persistent violent diarrhœa or dysentery, which quickly reduces the patient to a bag of bones, and usually terminates fatally. The administration of drugs has so far been of no avail in checking the progress of the malady, and reliance has to be placed entirely on preventive measures.

The disease is, according to Gaiger and Dalling, of a highly contagious nature, and is due to invasion of the blood by a microbe normally present in the intestines (*Bacillus coli communis*) which acquires, under certain circumstances, greatly increased virulence. The very important question as to how the disease is carried over from one season to another, has not been solved. It is not known whether the soil harbours the causal agent, but it is suggested that the ewe infects the lamb not by suckling, but through its fæces, etc.

A **preventive serum** is being tried and promises to be effective. Other preventive measures consist in the slaughter and proper disposal of the carcases of the affected lambs, and in feeding-off their mothers; also the adoption of sanitary precautions in the lambing-pen and care on the part of the shepherd to clean and disinfect his hands, boots, etc., after attending to sick animals.

"**Navel-ill**" or "**joint-ill**" is a form of blood-poisoning in lambs contracted shortly after birth, usually within a fortnight. "The inciting organism gains an entrance to the system by means of the umbilicus, the lamb becomes very lame, the joints are hot, swollen, and painful, and there is marked fever and prostration. *Curative treatment* is usually of little use, for even if a lamb's life be saved, it is unhealthy and unthrifty. *Preventive treatment* is most important. Where lambing-pens are used, they should be kept scrupulously clean. Lambs dropped in open pastures never suffer from "navel-ill"; it is therefore much better to use not permanent but temporary lambing-pens.

The Early Treatment of the Lamb.—When it is necessary to bring lambs that have been chilled into the house, they should not be placed near a fire, because a sudden change of temperature gives an injurious shock to the nervous system, which may result in physical collapse, or even in death. Cows' milk, given at blood heat, 98° F., *without water*, should have in it a little gin, or sweet spirits of nitre, to aid urination. Stricture of the neck of the bladder, the result of exposure to cold, is most common in male lambs, and is relieved by providing shelter, and gently rubbing the belly with the hand while the lamb is held up by the fore legs. Persistent cases are sometimes relieved, when the lamb is valuable, by dipping his hind-quarters in a bath of warm water not over 110° F. The lamb must subsequently be well dried and kept warm, to prevent a chill.

A motherless lamb, while young, should be fed five or six times a day, to prevent indigestion, accompanied by scour. The giving of a little cows' milk to a lamb while it is sucking its mother often induces diarrhœa or constipation, and in cold weather results in the development of swelled and stiff joints.

In "**twinning-on**" a second lamb to a ewe which has lost her lamb, the skin of the latter may be put on the living lamb for a few hours to give it the smell with which the ewe is familiar, and by which she is able to distinguish her own lamb if she has been allowed to lick it. Should she not have smelled or licked it, another lamb may be at once substituted for the dead one without any further precaution than that of rubbing its body over with the slime adhering to the skin of the dead lamb. Whisky rubbed on the ewe's nostrils and on the lamb soon after lambing, when the maternal instinctive fondness for the young is strongest, temporarily suspends the ewe's power of scent sufficiently to deceive her.

The Food of the Ewe.—About the end of March or beginning of April, ewes on arable land in the Midland counties and South of England are removed from around the ewe-pen, where, to encourage the flow of milk, they have had sprouting white swedes, or late-sown green-round turnips, which stand the winter well. The lambs are allowed to run before the ewes, and thus to secure the best of the young sprouts, by the hurdles being made so that they can pass through while their mothers cannot.

One acre (15-ton crop) is usually set aside per week during winter for every two hundred ewes, or 24 lb. each per day. Shelter can be readily provided when necessary, by thatched or wattled hurdles set up to form a cross thus +. The ewes are run for a week or ten days on early pasture ("seeds"); next for three weeks on rye, which ought to be finished before the end of April; then on clover, vetches, mustard, or some other forage crop; mangels follow; and later on, to give a change of food, cabbages are thrown to them while at pasture in the field.

The practice of training **lambs** to eat cake early is most important in feeding to produce fat lamb. They are thus taught before being weaned, by enclosing their troughs within hurdles through which they alone of the flock can pass.

Store male lambs are castrated at two or three weeks old; but not during frost, which would induce stiffness; nor in a hot sun, which might cause excessive bleeding if the testicles be removed by pulling. Lambs on rare occasions faint after castration, but soon recover consciousness. **Marking**, by taking nips from the ears (see page 680), if not done previously, is also now performed; while the tail is **docked**, to keep the sheep clean, should the solid excreta at any time become abnormally soft, as is frequently the case when lambs are put on luxuriantly grown food produced on naturally rich or highly-manured land, or when lean sheep of any age begin to improve rapidly.

There are Three Common Ways of Castration:—*First*, Either the scrotum or purse is slit, or the top is cut off by a knife (Fig. 86), and the testicles are drawn away by the teeth of the operator, or in modern practice by a pair of small forceps; *Second*, They are removed by iron clamps and the actual cautery applied after the scrotum has been cut; if a lamb is stiff next day, it should be bathed with hot water in the region of the wounded part; *Third*, By hazel-wood clamps dipped in powdered sulphate of copper, spread inside with lard, placed so that the neck of the cord supporting each testicle is gripped and held for half an hour. The pressure stops the circulation of the blood in the testicles, and prevents bleeding after they have been cut away. The top of the scrotum is removed, as the operator has then greater freedom in adjusting the clamps than when slits are made. This last way of making the incision possesses also the advantage of providing a free vent for the escape of humours which form in the "purse" during the process of healing, though on the other hand it reduces the size, which is a disadvantage in marketing as a butcher's animal. The latter methods are not liable to produce inflammation, and there is no danger, as in the case of drawing the testicles, of rupture, or bleeding in the region of the kidneys, causing a lamb to pine rather than to die immediately

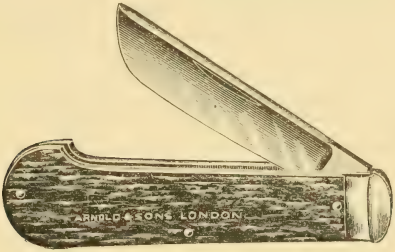


FIG. 86.—CASTRATING KNIFE.

after the operation. The third method is the safest, but it takes too much time in execution. It is the most suitable when well-developed lambs or old sheep are castrated.

Tetanus, Lockjaw, or **Trismus** is a spasmodic closure of the lower jaw which occurs in sheep, especially after castration, docking, or shearing. It is produced by the tetanus bacillus, which is about in the ground or on dirty instruments, and, finding lodgment in the fresh wounds made during these operations, manufactures a toxin which enters the blood circulation. To prevent the onset, strict attention to cleanliness should be observed while operating, and antiseptics (carbolic acid, lysol, etc.) freely used. *The symptoms* are:—"A spasmodic motion of the head, and fixed jaws, the neck stretched out and head bent back. The stiffness may give way to convulsions followed by renewed stiffness." *Preventive treatment* involves giving sheep fresh, clean pasture, and avoiding dusty or dirty folds, also disinfecting instruments before, during, and after an operation by immersion in Jeyes' fluid —or, better, 5 per cent. of carbolic acid, 1 teaspoonful to a pint of water. "*Curative treatment* is directed to wounds where the organisms can be destroyed by weak solutions of corrosive sublimate; to the absolute quietness of the patient; to the administration of Epsom salts as a purgative; and smearing the teeth every four hours with extract of belladonna as a sedative." As the navel is sometimes the point of entry of the tetanus germ, the disinfection of the cord or navel-string is advisable, and for this purpose perchloride of mercury, 1 in 500 of water, may be employed.

A Peculiar Form of Castration was extensively adopted when it was the practice, before the existence of railway facilities, to travel by road in October mixed droves of "cast" ewes (five years old) and old rams of the Cheviot or the Blackface breed from the Highlands of Scotland to the Southern counties. There the ewes were put to long-wool rams for one or two seasons to breed half-bred or cross lambs, to be fattened as hoggs; and the rams were sent to the butcher. To prevent the Cheviot rams getting the ewes in lamb on the way south, the "worm" (filiform appendage) was cut off. Dishonest breeders of Wensleydale rams at one time also practised it, to save themselves the trouble and expense of keeping their lambs of different sexes in separate flocks.

The **Copulatory Organ or Penis** of the ram is a curiously complicated structure, which has been described anatomically by Dr F. H. A. Marshall.[1] The urethra, or passage through which the urine and seminal fluid pass when ejected, is prolonged within a filiform appendage, about 1½ inches in length, and arising from the left side of the organ, as shown in the figure. It opens to the exterior at the end of the appendage. Marshall has shown that this filiform prolongation has an erectile structure, and since, if it is cut off, the ram is rendered barren, there can be little doubt that its function is that of insertion into the uterus or womb during copulation.

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[1] *Anatomischer Anzeiger*, vol. xx, 1904.

Washing, which should be done ten days before clipping, is usual in the case of most Lowland breeds of sheep, though it is not practised with the Scotch Blackface. It is never done in salt water, as this injures the wool for keeping. There ought to be a water-tight box in the centre of the pond for a man to stand in while doing the washing, in place of his having to get into the water. The washer takes hold of a sheep and keeps it moving in the water until the "yolk" or "eik" is washed out. This lanolin, which keeps the wool soft and unctuous to touch, is an excretion from the skin chiefly, but possibly also to some extent from the wool itself. It is used in pharmacy and in the manufacture of fancy soaps. It is most abundant on certain strains of the Merino breed and of Angora goats (p. 762). Hill sheep, such as Cheviots, are simply thrown into a large pond and made to swim through it once or possibly twice.

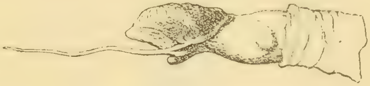

FIG. 87.

Distal end of ram's penis, as seen from the left side, showing glans, accessory glans, filiform appendage, and knob-shaped protuberance at proximal end of appendage. The prepuce is represented as having been folded back. Slightly reduced.

The Time of Clipping or Shearing is dependent on the weather, and, in the case of lean sheep, on the "rise" of new wool. Unless for special purposes, sheep are clipped in the new growth of wool. Cheviot rams for sale as breeders are an exception.

Eild sheep, or those not giving milk, are shorn first: from the beginning of May onwards, in the South, and ewes two or three weeks later. Exposure to cold by early clipping greatly diminishes the flow of milk, and might also cause death in some cases from inflammation. The new wool left upon breeding ewes or sheep in poor condition is not so dense or close as that on fat sheep, and consequently not so effective as a means of protection. Show sheep if clipped early require to be kept under cover. Fat sheep clipped for the spring market have, by law, woollen sheets put on them if the weather be at all cold, and neglect to comply with this regulation is punishable. Lambs are not shorn the first year, except in a few districts of England where they are highly fed, and are a good size when summer arrives. Twenty-five to thirty stock sheep of a large breed is a good number for a man to clip in a day by piece-work. If the shearer be restricted to twenty per day, as in the case of fat sheep for market, which require to be clipped over the back and to be done bare and well, the cost is greater.

Shearing by mechanical means is general in the Australian colonies, where the numbers of sheep are counted by tens of thousands, and where labour is not only expensive but difficult to control. Shearing machines are also securing a footing in some districts of this country in two forms: the mechanical-power machine for large flocks, driven by an oil-engine; and the hand-power machine, shearing only one sheep at a time, worked by a strong boy, or by petrol.

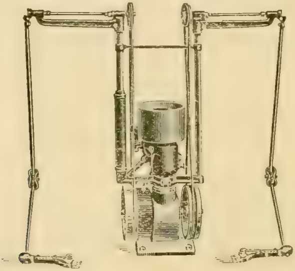

FIG. 88.—COOPER-STEWART'S AUTOMATIC DOUBLE SHEARING-MACHINE.

Driven by one gallon of petrol a day.

The **advantages of the shearing-machine** over the hand-shears are—(1) an increase of work, by some 20 to 25 per cent.; (2) less skilled labour can be employed at a cheaper rate; (3) more wool can be removed; (4) the work is more uniform; and (5) no injury results to the wool by making double cuts, which shorten the fibre and increase the amount of waste in manufacture. The Wolseley machine was the first to come prominently to the notice of the public, but there are now a number of patentees of machines which, differing in minor details, are in certain broad principles like the pioneer machine (see the Cooper-Stewart Machines, Plates CCIX. and CCX. A). Each machine is driven by a flexible shaft making from 2000 to 3000 revolutions per minute. The cutter is nicely adjusted to a comb, in the manner of the comb-like cutting teeth of an ordinary hand horse-clipping machine, and moves from side to side 4000 times per minute over the comb, which rests upon the skin of the sheep, and threads its way among the wool, close to the surface of the body. As the points of the cutter are protected by the comb, it is much less likely to break the skin; yet the machine does cut it if care be not exercised, and the skin be not pulled level. Before the workman lets the sheep go, it is usually "buisted" or **marked** by a large iron letter dipped in hot (but not quite boiling) Archangel tar, darkened in colour with a little lamp-black. As the wool grows pretty long, these markings become first indistinct and then unreadable, and paint or red kiel, after being mixed with water or linseed oil, is rubbed on some part of the wool. The mark should not be extensive in the case of Lowland sheep, as it injures the wool to which it is attached. Paint mixed with oil is less bright at first, but it is the more durable of the two.

After all visible and removable impurities such as dung ("clarts") are removed, each fleece of wool is carefully rolled inside out into a bundle, except in such cases as that of Scotch Blackface wool, which is turned the other way. The neck end is last rolled on, and, to tie the whole together, it is made into a band by twisting. The wool should be at once, while warm, packed in strong canvas bags or sheets, as the operation is then more easily and better done.

Certain lands and climates produce better and finer wool than others, whatever be the breed of sheep. Rich and also heavy soils produce strong wool; light soils, as Down lands on limestone formations, wool of a finer quality. Wool felts, mats, or "wauks" (*i.e.*, sticks very closely together) on the backs and necks of lean sheep in wet winters, and is thereby lowered in value. The best wool is got from sheep that are kept constantly thriving; there is then no break in the fibre, such as takes place when sheep get very poor in condition.

Weaning, in the South of England, takes place about the beginning of May and onwards; in the North, the time is the end of June and the beginning of July, and even later. Lambs should have their pastures frequently changed, if turned out in a field "at the breadth," and should never follow ewes or other sheep, as they pick up parasitic worms which have been dropped by their predecessors, and are seriously injured thereby. Sheep thriving badly from ordinary causes, such as grass-scour, may almost invariably be "set going" by a change to sainfoin, in those districts where sainfoin flourishes, or by the addition of a moderate allowance of cake or corn to the natural food. Ewes immediately after weaning, with the extra feeding discontinued, are run over the poorest and barest pasture to dissipate the milk, which, unless precautions be taken to prevent it, is liable to cause swelling of the udder for a few days. It is quite unnecessary to milk ewes at this period by hand, as was at one time the custom even in hilly districts. Ewe-milk cheese, of a rich green colour, and of very fine flavour, was at one time largely made in this country; but, as ewes were milked from behind, the operation was not one of the cleanest.

When lambs are to be fed on a bulky, well-grown forage crop, as clover, rape, or vetches, they should at first go on only for a few hours each day, and be turned out into a grass field at night. This treatment should also be adopted in wet weather, especially if the land be at all heavy. There is risk of hoven, which may end fatally, if lambs are suddenly put on wet clover; or of impaction, developing into "stomach staggers," if the clover be very dry, or if there be not a proper supply of water. Sheep, contrary to a common erroneous belief, drink freely in dry weather, and those giving milk require to do so more than others.

CHAPTER XXXII

MANAGEMENT OF SHEEP (*continued*)—FEEDING

Folding of Forage Crops—Winter Feeding on Roots—Fodder and Concentrates—Urinary Disorders—House Feeding—Rations, Live-Weight Increases and Costs—Dentition.

LAMBS, or hoggets or tegs as they become, may after weaning and throughout the autumn be given a free range on grass; or they may be folded on forage crops, such as seeds or clover aftermaths, lucerne, sainfoin, rape, etc. Grass for weaned lambs should be as clean and as fresh as possible, and should have been kept clear of sheep stock for some time before the lambs are turned on, otherwise these will be likely to pick up parasites, and to do badly. Folding entails a good deal of extra labour and equipment compared with the system of unrestricted grazing, but it prevents the wastage that occurs from trampling if the sheep are allowed to wander at will among the standing forage. Folding is the more necessary the heavier the crop; it is far more extensively done in the South than in the North, hurdles being the common means of enclosure. Nets, wire or cord, on light stakes are also used, and are commoner in the Northern districts. With heavy crops the hurdles are moved forward every day, in order to provide the animals with a regular supply of fresh food. The hurdles in rear of the sheep must also be moved at frequent intervals—of, say, two or three days—in order to bring about a uniform distribution of manure. With perennial forage crops, notably lucerne, the sheep must never be allowed to go short of food, as otherwise they are likely to eat out the crowns of the plants and so kill them. In Down districts it is a common practice to shift the sheep from the open down to folds on the arable land, and back again, daily.

Fattening tegs, and on arable farms stock tegs as well, are transferred from aftermaths, young seeds, or other summer forage crops to early soft turnips, such as greystones and whites, about the end of September or beginning of October. If supplies of rape, mustard, kale, etc., are available these will ordinarily be consumed first and the transfer of the stock to turnips will be later. Turnips, if they are not quite ripe, should be pulled a few days before the sheep reach them, or a horse hoe with broad cutting tines passed between the rows to cut the tap roots. This makes them sweeter and tends to prevent indigestion, which shows itself in the outbreak of scour and in an increased death-rate. It is also of importance, from the point of view of avoiding a high death-rate, to make the change of food as gradual as possible; folding the animals on roots for only a short daily period at first, and gradually extending this period day by day for two or three weeks. Root-feeding must therefore begin while there is yet a considerable supply of grass or forage crops remaining. Soft turnips are followed in turn by ordinary yellows, then by green-rounds or other of the harder frost-resistant sorts, in late winter or spring by swedes, and sometimes in late spring or early summer by mangels. Stock and store tegs are generally kept folded on the standing crop till about New Year or shortly afterwards, when they will usually begin to lose their incisor teeth, and must have their roots "fingered." Fattening tegs should preferably have their roots cut, and fed in boxes, whether or not they are capable of breaking them for themselves. The labour of cutting is of course considerable, but will generally be repaid in greater rapidity of fattening. Small portable petrol engines are useful as a source of power for root cutting in the field.

Sheep folded on roots are occasionally given no additional food, but it is advisable from every point of view to feed some hay, and, in the case of fattening sheep, concentrates as well. Apart from enabling the animals to consume more nutrients, and hence to make more rapid live-weight increments, suitable dry foods act as preventives against scour and other ailments. Bruised oats and barley, dried distillers' grains, and undecorticated cotton cake are favourite materials to use in the early part of the season, and a mixture of two or more is very generally preferred. Later on, when the liability to scour diminishes, almost any of the ordinary concentrates may be used. Fine meals must of course be employed in limited proportion only, otherwise the food will tend to be blown about and lost; and a moderate amount of fibre is necessary to keep the mixture open and so prevent digestive troubles. Concentrated food, in case the animals have not been accustomed to it, must be given in gradually increasing quantity, beginning with, say, ¼ lb. per head per day and increasing this up to perhaps 1 lb. during the last stages of fattening. These figures would apply to tegs of average size, say 80 lb. live-weight when put up to fatten and 120 lb. when ready for the butcher. Hay may be chaffed and mixed with the concentrated food, but it is usual to offer it, *ad libitum*, in long condition. Hay-racks should be covered with iron sheeting in order to prevent the fodder being soaked with rain, and should have a narrow trough fixed along the bottom to catch broken pieces that would otherwise be lost. This is important where leguminous hays are being used, as the leaves of the plants are usually brittle. Clover, lucerne, and rye-grass hays are probably the most suitable varieties for sheep. Timothy hay is much less satisfactory for sheep than for horses, on account of its hardness. Of fodders other than hay, pease-straw is largely used in districts where this crop is grown. Oat straw, generally in the form of chaffed sheaves, *i.e.*, grain and straw together—is used in some districts for stock tegs. If the supply of roots and concentrate be limited, average tegs will eat up to 1 lb. of hay per day, or more. But if the animals are allowed practically all the roots they will eat—say 16 lb. per day—if these are of good quality, and if a fair ration of concentrate is being given, the daily consumption of hay will generally not much exceed half a pound. Different lots of sheep, however, show a good deal of variation in the ratio of roots to hay that they will consume, and a good deal depends on the quality of each that is offered. The preference of the animals should be studied and met, in the case of fattening tegs, so far as is consistent with their health, since the object is to get them to consume as much food as possible.

Turnip troughs, 9 ft. long, should be almost square in section, say 11 in. broad at the top, 9 in. at the bottom, and 10 in. deep. For "artificial" food a second set of smaller troughs is necessary. They are generally made V-shaped in section, of two 8-in. boards set at right angles. A length of 9 in. per sheep will suffice for those of average size, this allowing 18 in. of actual standing room when the animals are ranged along both sides. Fattening sheep should be given their roots frequently and in small feeds, three or four times a day, as the cut slices soon become unpalatable when they are left lying in the boxes. When the concentrate ration is increased to exceed half a pound it will best be given in two feeds.

The labour required for winter feeding may be reckoned at one man to 200 sheep, if the roots are to be cut, or one to 400 otherwise. The root supply for the latter part of the winter is generally stored in heaps of convenient size, which are dotted over the field at regular intervals and roughly covered. The nets or hurdles are moved close up to each heap in turn, so as to cause a minimum of labour in carrying food, and to ensure an even distribution of manure over the field. A hundred sheep are as many as ought to be placed in one lot on roots. With the larger breeds this number might with advantage be halved. Nets should be of 4-in. mesh, and either nets or hurdles should be about 4 ft. high, the actual height necessary varying according to the docility of the breed.

Stock tegs are generally given little or no concentrated food, and should be brought through the winter in lean but growing condition. If made fat during their first winter they are likely to prove less hardy in later years.

Urinary disorders appear, in some districts, late in spring among sheep fed on roots, especially swedes and mangels. Males are more liable to become affected than females. Where such derangements occur, the food must be changed without delay, and linseed cake given, along with daily doses of ½ drm. nitrate of potash. And, in order to induce warmth, the backs of affected animals should be covered with pieces of strong canvas, about 2 ft. × 2½ ft., smeared with boiled linseed oil to make them waterproof. The best preventive of this affection is a plentiful supply of pure water, of which the animals will drink quite freely as the dry weather of spring comes on, and the proportion of moisture in the roots diminishes. In winter water is never necessary unless the root ration is greatly restricted.

During wet and stormy weather sheep on roots make poor progress and, particularly on soils that are liable to puddle, they soon get into very unsatisfactory condition. In such circumstances it may be necessary to remove them to pasture land, selecting the driest and most sheltered fields that are available. A few farmers in the colder and wetter districts have adopted the practice of housing their fattening sheep. Experiments to test the amount of benefit obtained have, as might have been expected, given somewhat contradictory results. It seems that in dry and quiet weather, even if it is frosty, sheep outside increase in weight quite as rapidly as those housed; but that under bad weather conditions the advantage from housing is considerable. In countries where the winter is severe, sheep are, of course, frequently or even regularly housed. A well-ventilated shed, 110 ft. by 60, erected by John Ross at Millcraig, Easter Ross, was found to accommodate comfortably about 400 sheep, the space being divided into four equal sections of 1500 sq. ft., each taking 100. The floors of sheep-sheds must be kept dry and well littered, as wet conditions quickly induce lameness.

Amount of Food.—Daily rations for fattening tegs may be reckoned on the basis of 2½ to 3 lb. of total dry matter per 100 lb. live-weight. Small sheep will eat proportionately more than large, and young ones more than old. In the last stages of the fattening the consumption of food tends to diminish to about the lower limit stated. Care must of course be taken that the energy-value is sufficiently high, that the coarse fodder is given in sufficient quantity for the maintenance of health, and that the protein supply is ample. The last point refers particularly to young and rapidly growing animals. The following are examples of rations for tegs of different weights and at different stages of fattening, supplying in each case the necessary dry matter, protein, and energy-value in suitable form :—

	Percentage Composition.			Total contained in Ration.		
	Dry Matter.	Digestible Crude Protein.	Starch Equivalent per 100 lb.	Dry Matter.	Digestible Crude Protein.	Starch Equivalent.
I. 60 lb. Live-Weight—Commencement of Fattening.						
14 lb. Yellow Turnips . . .	8·5	6·6	4·4	1·19	·08	·62
⅓ lb. Clover Hay	84	6	32	·28	·02	·11
½ lb. { Broken Peas, 1 Undec. Cotton Cake, 1 Dried Distillers' Grain, 2 } .	90	18	56	·45	·09	·28
				1·92	·19	1·01
Or, per 100 lb. live-weight . .				3·2	·32	1·7
Standard (Wood and Kellner) .				3·2	·32	1·7
II. 100 lb. Live-Weight—Middle of Fattening Period.						
14 lb. Swedes	11·5	1·1	7·3	1·61	·15	1·02
½ lb. Seeds Hay	86	5	26	·43	·02	·13
¾ lb. { Oats, 1 Undec. Cotton Cake, 1 Dried Grains, 1 } .	88	14	52	·66	·10	·39
				2·70	·27	1·54
Standard (Wood and Kellner) .				2·85	·25	1·60
III. 120 lb. Live-Weight—Nearly Fat.						
16 lb. Swedes	11·5	1·1	27·3	1·84	·18	1·07
⅓ lb. Seeds Hay	86	6	24	·27	·02	·08
1 lb. { Broken Maize, 1 Crushed Barley, 1 Palm Nut Cake, 1 Bran, 1 } . . .	87	10	68	·87	·10	·68
				2·98	·30	1·83
Or, per 100 lb. live-weight . .				2·48	·25	1·52
Standard (Wood and Kellner) .				2·7	·21	1·5

The above rations are based on the assumption that roots are available in large quantities, as will normally be the case on farms where winter fattening of sheep is carried out. If, however, roots are scarce and good hay is available, good results could be obtained with half the foregoing root rations, substituting hay at the rate of about 1 to 8 lb. of turnips or 5 lb. of swedes. Under ordinary farm conditions it is not possible to work closely to feeding standards, because roots and hay cannot be conveniently weighed. Even if this were possible the feeding value of both materials varies within rather wide limits and is not easily ascertainable. Moreover, close conformity to standards is not necessary. The figures given are of value rather from the point of view of enabling the feeder to estimate the various quantities of material to be set aside as approximate requirements, the actual rations being left to be determined by the animals themselves. Concentrated food should, however, always be weighed, or measured on a weight basis.

On rations like those given above, hoggets may be expected to increase in live-weight at the rate of 1 lb. to about 7, 8, or 9 lb. of dry matter fed. The young and rapidly growing animal will, of course, make weight more economically than one whose growth is slowing down, or that is in the latter stages of fattening. Thus, for example, a hogget of 100 lb. live-weight, consuming, say 18 to 20 lb. of dry matter weekly, may, on the average, put on 2¼ to 2½ lb.; and such increases are commonly obtained, on the average, over moderately short fattening periods.

Tegs of eight to ten months of age, in wool, and in good condition for the butcher, may be expected to yield about 52 or 53 per cent. of their fasted live-weight as dressed carcase. Younger or leaner animals will frequently fall below 50, and sometimes as low as 46. Older and fatter animals dress higher—56 or 58 per cent. being not uncommon for fat wethers. Newly-clipped sheep will naturally dress more than unshorn ones, the difference amounting to 4 to 6 per cent. generally, but varying with the breed. In wet weather the fleece carries a considerable amount of moisture and mud, and thus under such conditions the dressing percentage may appear to be exceptionally low.

Since, in fattening, the percentage of carcase to total weight increases to the extent of 6 or 7 per cent., it is sometimes reckoned that for ordinary fattening periods of three to four months two-thirds of the live-weight increase will appear in the dressed carcase.

The following is an example of a calculation of the **cost of feeding a teg** for a period of sixteen weeks:—

	£	s.	d.
Initial Live-Weight.—80 lb. at, say, 6d. per lb. live-weight	£2	0	0
Food.—100 lb. swedes per week—1600 lb. at 18s. per ton, less manurial value 4s. per ton	£0	10	0
3½ lb. clover hay per week—56 lb. at £4 per ton, less manurial value £1, 12s. per ton	0	1	5
5½ lb. cake and corn per week—88 lb. :—			
Say 32 lb. dried grains at £7, less £1, 17s. 28 lb. palm nut cake at £8, less £1, 13s. 28 lb. linseed cake at £10, less £2, 5s.	0	5	0
Shepherding.— $\frac{1}{200}$ of man's wage 30s. per week for sixteen weeks	0	2	5
Depreciation on netting and other equipment	0	0	6
Loss—say 2 per cent. deaths, carcases worth half value	0	0	6
Net cost of feeding	£0	19	10

Live-Weight Increase, say 2¼ per lb. per week for sixteen weeks—

$$36 \text{ lb.} \times \frac{19\text{s. } 10\text{d.}}{36} = 6{\cdot}61\text{d. per pound.}$$

To find **cost of mutton** per pound deduct value of skin and offal—say 8s. from total cost of production (£2, 19s. 10d.). Estimate dressed weight—

$$116 \text{ lb.} \times \frac{52}{100} = 60 \text{ lb.} \quad \text{Then } \frac{\text{£}2,\ 11\text{s. } 10\text{d.}}{60} = 10\tfrac{1}{2}\text{d. per lb. nearly.}$$

The actual figures used will of course vary from time to time according to the rate of wages, prices of manures, feeding-stuffs, etc., and the value of wool, offals, etc.

Sheep, either rough or clipped, are sometimes sold by the feeder at a certain rate per pound, "sinking the offal." This means that the seller is paid on the actual weight of dressed carcase; nothing being reckoned for the head, feet, skin, web fat, intestines, etc. In ordinary commercial sheep, the skin may carry from 2 up to 7 or 8 lb. of clean wool, and it has of course a value apart from the wool. The web tallow is the next most valuable item in the offals, making commonly about 5 per cent. of the total live-weight, but in very fat animals considerably more.

As regards market demands and values, it is very general to find that carcases weighing over, say, 60 or 65 lb. bring a lower price per pound than those of lesser weights. It is therefore generally advisable to have animals fat at live-weights of 100 to 120 lb., even if they are capable of growing to much greater weights. As regards condition, young tegs, such as are sold in autumn and early winter, are rarely too fat. In late winter and spring, however, with larger animals and warmer weather, it is easy to make the mistake of overfeeding. The last stage of fattening is the most costly, measured in terms of the increase, and if the value per pound of carcase is depreciated by excess of condition there is thus a double loss.

Dentition.—What may be called the normal dentition is shown in Fig. 89. With early maturing breeds that are intensively fed the permanent teeth appear earlier. The Smithfield rules imply that the earliest possible dentition is somewhat as follows :—

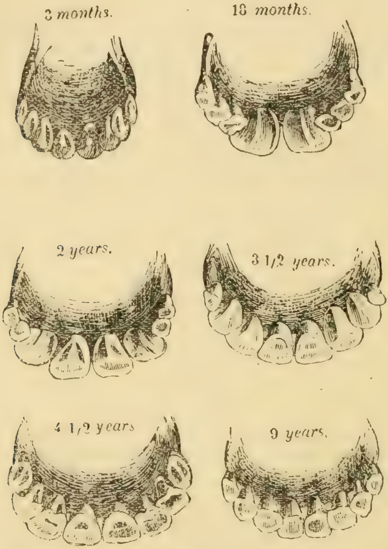
3 months.
18 months.
2 years.
3 1/2 years.
4 1/2 years
9 years.

FIG. 89.—SLOW-MATURITY DENTITION. When forced, sheep get their permanent teeth a few months earlier.

Central incisors appear	12 months
Second pair of incisors appear	18 ,,
Third pair of incisors appear	24 ,,
Fourth (corner) pair of incisors appear	36 ,,

CHAPTER XXXIII

MANAGEMENT OF SHEEP (*continued*)—EXTERNAL PARASITES

Dipping—Sheep-Dipping Orders (Scotland), 1906—Kades—Grass-Ticks—Sheep Lice—Black Flies—Maggot Flies—Scab-Mites—Life-History of Scab-Mites—Dip Materials—Different Forms and Sizes of Dippers—Pouring—Smearing.

DIPPING is practised in accordance with the custom of the district at various times during each of the four seasons—spring, summer, autumn, and winter—on a dry day and when the wool is dry; for example, immediately after clipping, or, still better, a fortnight later, when the wool has grown a little, and is able to retain more of the effective material of the dip, and when the skin is not so liable to be scorched by the sun while wet. The lambs should go through the tank at the same time, but it is necessary to take precautions against the lambs losing their mothers entirely, on becoming prematurely weaned, and doing badly in consequence. To this end ewes and lambs should be dipped in small lots—hill sheep (for example) in their various hefts. Ewes and tups should either be dipped after tupping time or one clear month before it, in order to prevent "firing" the penis of the rams. "Grit" ewes, handled with infinite care, go through the dip two days before lambing. An accident then only accelerates the operation.

By the **Sheep-Dipping (Scotland) Orders** of the Board of Agriculture, dated 10th February and 9th April 1906, it became necessary, within the area referred to, twice during each year thoroughly to immerse sheep, in a sheep-dip approved by the Board, and made up in proportions authorised by it—the *first* dipping to take place between 1st January and 31st August, and the *second* between 1st September and 12th November. The Sheep-Dipping (Scotland and North of England) **Order of 18th February 1907** widened the area of the Scotch Orders, and relaxed some unnecessarily irksome regulations.

The Sheep (Double Dipping) Order of 18th June 1920 of the Minister of Agriculture and Fisheries, by virtue of powers vested in him under the Diseases of Animals Acts, 1894 to 1914, revokes the similar Order of 1914, requires that sheep within a double dipping area be dipped twice, with an interval of not less than seven and not more than fourteen days between the dippings, in the presence and to the satisfaction of an inspector of the local authority, by a thorough immersion in a sheep-dip, approved by the Minister of Agriculture and Fisheries for sheep scab, or purporting to be so approved, and that, until all such sheep have been so dipped, the movement of these sheep from any given place (except with a license granted by an inspector of the local authority of the district), is prohibited, under penalties stated in the Act of 1894.[1]

The **object of dipping** is to mitigate or prevent altogether the attacks of parasites, viz.—the kade, *Melophagus ovinus;* the louse, *Trichodectes sphærocephalus;* the sheep maggot-flies, *i.e.*, the green bottle, *Lucilia sericata*, and the blue bottle, *Calliphora erythrocephala;* the scab-mite or itch-mite, *Psoroptes communis;* and species of tick or Ixodes. The Sheep-Dipping Orders of 1906 and 1907 were directed against the last-named pest, but they **were defective** in that they did not prescribe double dippings with an interval of fifteen to twenty-one days between the first and the second section of the operation, in place of single dippings, which, as explained on previous page, are incapable of effecting the object.

Kades or **Kaids** are slightly flattened, six-legged, spider-like insects, wingless flies which move about in the fleeces of sheep, and live by piercing the skin and sucking blood. They may be got rid of by timely dipping, and repeating the operation within three weeks, to kill the forms which have within that period issued from the pupa cases, upon which the common dips may have exercised no injurious influence. They are most abundant on sheep in poor condition, and during winter when there is little sun, as they do not then come to the top of the wool to bask and so get shaken off. Their bite on man produces small, persistently itchy swellings. (See p. 733.)

Grass-ticks (eight-legged) fix themselves by sending their rostrum into the skins of sheep and other animals, as horses, cattle, pigs, dogs, rabbits, and also men. The females do not move about much after gaining a footing on an animal's hide, but become fixed, and gorge themselves with blood drawn from the unwilling host. They increase greatly in size, and finally drop off into the grass to lay their eggs. From the eggs hatch young six-legged forms, which after a moult attain the fourth pair of legs and after a second moult become adult.

The biting lice are represented on the sheep by *Trichodectes sphærocephalus* (Fig. 90). Its head is as broad as long. The general colour is whitish, with dark spots and a dark head. These lice exist usually in greatest numbers on the head and hairy parts of the body, and produce much irritation, which prevents sheep from thriving. With a little care, and by adopting the comparatively new practice of dipping sheep over the head, they can be quite destroyed. Most well-managed flocks are free from them. A **sucking louse**, *Hæmatopinus ovillus*, affects the head and face of sheep.

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[1] Farmers should apply to the Ministry of Agriculture and Fisheries for copies of the various Orders.

Black flies, which are found often in swarms in the northerly parts of Europe and North America, are sometimes a grievous pest to both animals and man. They belong to the family *Simuliidæ* and the genus *Simulium*. By means of their stabbing mouth-parts, the females make wounds like mosquitoes and suck up blood. They may also live by sucking any raw surface, as an accidental cut made by shearing, or the crowns of rams that have been fighting. When very numerous, these flies irritate and unsettle sheep, and prevent wounds healing, especially if these be about the top of the shoulder, where the animal can do little to protect itself. The flies are small and thick-set, with stiff, ten-jointed antennæ, humped thorax, and broad wings, and are black or reddish-brown in colour. The larvæ and pupæ are aquatic.

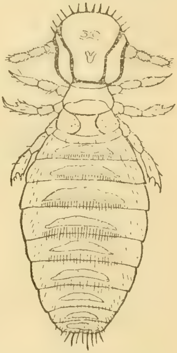

FIG. 90.—*Trichodectes sphærocephalus* (Nitzsch). ♀. Dorsal surface. × 30 (p. 716.)

The maggot-flies, the green and blue bottle flies, do serious damage by laying their ova, during warm weather, on any part of the wool which has been wetted or soiled with solid or liquid animal excreta or certain inferior forms of dip material. In a few hours after the sheep are thus "fly-blown" or "struck," if the day be hot, the maggots are hatched, and immediately find their way to the skin to work mischief. They grow rapidly and, if not destroyed, they are able to cause death within a few days. The presence of maggots may be easily detected by the wool on the parts attacked becoming damp on the surface and dark in colour, and by the restless and uneasy movements of the sheep—including turning round and attempting to bite the affected part, lying down often, then rising and running a little, and taking shelter away from the rest of the flock at the back of a wall or among rank undergrowth. A sheep may at times clear itself of its tormentors by rubbing in a loose sandy bank or "scaur"; but the shepherd has usually to dress each animal carefully, at least twice, with a strong-smelling solution which destroys the maggots without injuring the raw parts of the skin. No ordinary dipping material used for the destruction of the insect parasites previously described is strong enough to kill maggots. Sores should be kept soft and in a healthy healing condition by the application of carbolic oil. The spirit- or oil-of-tar is very useful, if there be no broken skin, to prevent a second attack in very bad cases, by sprinkling the top of the wool or any soiled part with it; but it darkens the wool, and it also causes much irritation on a raw or maggot-wounded surface. Maggot-flies may sometimes be prevented from striking the fleece if sheep are kept clean by clipping away all soiled wool in the region of the tail, and by dipping them at times with a strong-smelling solution containing a quantity of carbolic acid and sulphur, but when the flies are numerous the sheep may be "struck" anywhere. When it is important to have the scrotum well covered with wool, as is the case in certain breeds of sheep, ram lambs are not kept in the dipping-tank the usual time, as prolonged submersion has a tendency to make the wool fall off those parts. They are frequently not dipped in the usual way, but a concentrated solution of dip material, with a strong-smelling fly-powder added, is rubbed over the backs with a scrubbing brush. Sprinkling the backs with a mixture from a "rose" can, or still better, a lime-wash spraying machine, is a common practice when large numbers of sheep require to be protected. The sheep are first packed closely together in a fold, so that the dipping stuff when showered on, cannot fall to the ground. Maggots have been known to effect great improvement in a bad case of foot-rot by feeding on the diseased part, but their work would be difficult to regulate as a remedy for the ailment.

Dr R. Stewart M'Dougall[1] writes:—In Britain the maggots of two different flies are found doing harm to live sheep—the green bottle, *Lucilia sericata*, and the blue bottle, *Calliphora erythrocephala*. The green bottles have a brilliant metallic green colour not concealed by light dusting, while the blue bottles are not brilliantly metallic and the thorax shows a light dusting. The blue bottle larva, somewhat larger than that of the green bottle, is typically a carrion feeder; but it is also found on live sheep and is then more of a surface feeder than its green bottle rival. The green bottle, though also a carrion fly, is in Britain the chief enemy of live sheep, its maggots burrowing into the flesh and doing great harm if the attacked sheep do not receive prompt attention. The female settles on the sheep and lays her eggs in clusters on the wool; in some hours these eggs hatch, and later, the maggots, by means of their mouth hooks, enter the flesh. When full grown the maggots press themselves out of the wound and fall to the pasture, where in some place of shelter they pupate. In the most favourable conditions in Britain the whole life cycle can

[1] See also his article on "The Sheep Maggot and Related Flies," *Transactions of the Highland Society*, vol. xxi., 1909.

be completed in about a month, but cold may greatly lengthen the period. The worst time for sheep maggot in Britain is from the middle or end of July to the beginning of September.

Infected sheep show such symptoms as, matting of the wool fibres; discoloration of the wool where the maggots are working; a continual wagging of the tail; oozing from the wounds of a sticky fluid; a falling out of the wool.

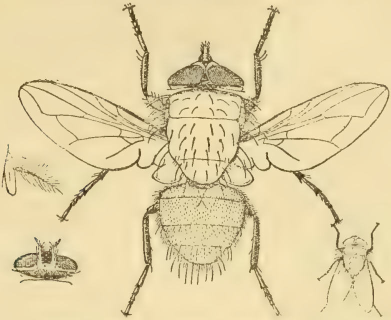

FIG. 91.—GREEN BOTTLE (*Lucilia sericata*), Male (× 3) Antenna. Female head, dorsal view. Natural size; resting position, in both figs.

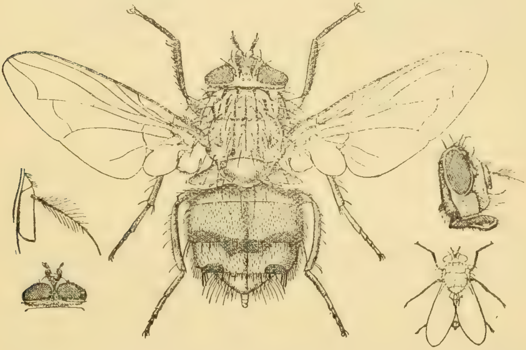

FIG. 92.—BLUE BOTTLE or BLOW-FLY (*Calliphora erythrocephala*), Female (× 3) Antenna. Male head, dorsal view; side view of head.

Dipping does not procure immunity for any prolonged period. Among remedial measures are the isolation of infected sheep; the dressing of infected places with turpentine and rape-oil in equal parts, or dilute paraffin oil, and dusting with sulphur.

In Australia there has been very great loss owing to sheep maggot-flies. The loss has increased from typically carrion feeders partly changing their habits and attacking live sheep. Both native and introduced species are among the culprits. Froggatt names the following species as harmful: the smaller yellow house blow-fly, *Calliphora oceaniæ;* the golden-haired blow-fly, *C. villosa; Pallinia stygia;* the blue bottle; the metallic blue blow-fly or hairy maggot-fly, *C. rufifacies;* the small green blow-fly; the green bottle, *Lucilia sericata.*

The problem of sheep maggot-flies became so serious in Australia, that to learn about the species doing the harm, and the possible remedies, William Cooper and Nephews, just previous to the War, offered a series of money prizes for the best essays on sheep maggot-fly in Australia. Various States have made similar inquiries and valuable Reports have been published by W. W. Froggatt and J L. Froggatt.

In New Zealand, David Miller, F.E.S., found that the two worst species are the golden-haired blow-fly, and the green bottle. Sheep maggot-flies are also pests in South Africa and in America.

Scab-mites are microscopic, and very much smaller than any of the other usual parasites. When they are present, patches of the wool become white, and the sheep, by biting and rubbing, detach quantities, the wool being left in little white locks which give a rough and speckled surface. When felt by hand, there is a hard brittle scab on the skin, at the roots of the wool under and at the edges of which the creatures shelter. This scab must of necessity be cleared off to prevent the extension of the disorder, which is most contagious, and is ultimately fatal to life if not attended to. The Highlands of Scotland, or north of the Forth and Clyde, was at one time the stronghold of scab, but the chief centre of infection, as shown by the Board of Agriculture weekly returns of outbreaks, was transferred to Wales, and in recent years it has become too general and may appear anywhere. It is regrettable that it exists in this country, though it is possible to stamp it out, as has been demonstrated by the energetic action of the Stock Departments of the leading Australasian Colonies (now States), where it was completely eradicated many years ago. After a long drive or railway journey, when sheep from the Highlands of Scotland or Wales are packed closely and heated, scab is liable to break out in a few weeks, although not observed in the flock from which they came. The rule is to dip Highland sheep about a week, but not more than ten days, after coming off rail, and the danger disappears.

The Life-History of the Scab Parasite.[1]

The common scab, otherwise termed "acariasis" and "itch," of sheep, is due to the injurious action of the scab-mite, *Acarus psoroptes communis*, Fürst, var. *ovis*. This parasite is confined to sheep, and lives upon those parts of the skin which grow wool. Head scab is produced by another distinct species of mite, *Sarcoptes scabiei*, de Geer, var. *ovis*, which lives on any part of the skin growing short hair, but most frequently on the head. Burrowing more deeply into the skin, it resembles the *Sarcopt* which attacks the common goat, and it is not so easily reached by external dressings or dips as the *Psoropt*. In this country both species cause great pecuniary loss and much labour which might be rendered unnecessary.

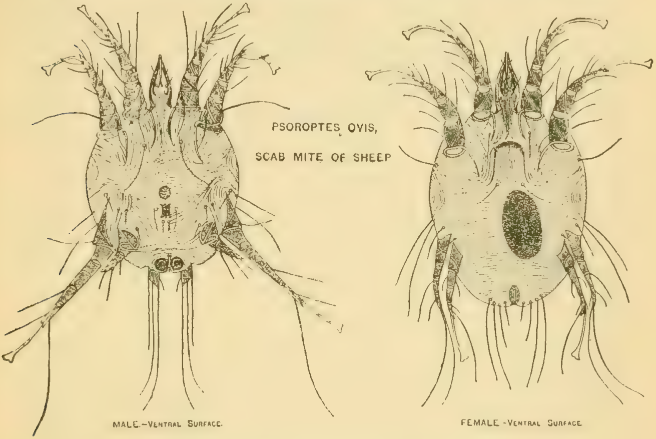
PSOROPTES OVIS,
SCAB MITE OF SHEEP
MALE.—VENTRAL SURFACE.
FEMALE.—VENTRAL SURFACE.

FIG. 93.—SCAB-MITES—MALE AND FEMALE (magnified).
(*Drawn from nature by Mrs D. Hutcheon.*)

The life-history of the *Psoroptes communis* is simple; but an accurate knowledge of it is all-important to those concerned. In the active forms it is easily destroyed by the poisons which effective dipping materials contain; but the eggs are, like the germs of so many low-life forms, practically indestructible by the ordinary means at the disposal of the farmer. It is therefore necessary to destroy all the moving *acari* by a preliminary dipping, and then, having waited until the eggs hatch out naturally, overwhelm the new brood by a second dipping before they are old enough to propagate. If this work be perfectly done, the cure is complete; but it is not all so simple as it at first appears. The mites live by wounding the external surface of the skin, which becomes very much irritated and inflamed as a result of the action of the effective hooked and pointed mandibles. Pustules form and exude a serous fluid which dries into a crust or scab. This gradually extends and thickens as the colony becomes more numerous and the irritation and exudation greater. Under the edges of these scabs, which are firmly held in position by involving the bases of the wool fibres in their vicinity, the females find shelter and suitable repositories for their eggs. Each female when adult (fifteen days old or longer, according to the environment) produces about fifteen eggs, which hatch in two or three days, some two-thirds of them developing into females. The newly-hatched young have only six legs, but the number after a moult is increased to eight. The young migrate to fresh skin, and the affected area grows after the fashion of "fairy rings" in pastures, the active part being that at the edge of the expanding area. At first the development is slow, and a flock may be slightly affected for weeks without much chance of the disease being discovered; but in two months or less, the process of the increase in numbers proceeds at a rapid rate, and detection by the naked eye becomes easy.

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[1] From the Author's paper on "Scab in Sheep" in the *Transactions of the Highland and Agricultural Society of Scotland*, 1900, *q.v.*

Such is a brief account of the common means by which the affection spreads on a single sheep. A scattering of the colonies takes place as the animal bites or rubs in the effort to relieve the excessive itchiness with which scab is associated. In rubbing on earth-banks, walls, rocks, and rubbing-posts, a few scab-mites are left on the "rub," to be transferred to the next sheep that come along to exercise the habit natural to them, although they may not be affected with scab. Scab-mites do not propagate away from the skin of a living sheep, but under favourable conditions the mature forms have been known to exist for a period of twenty-one days on "rubs," or in dry earth or manure upon which sheep have been lying; and the eggs have been proved to retain their vitality for years in a dry and equable climate, like the Karoo area of South Africa, and to hatch out on gaining access to a sheep. It is this wonderful vitality of the egg which has in a great measure led to the belief in the spontaneous-generation idea, and which makes the stamping-out process difficult.[1] But the chances of distribution by this means are enormously reduced when outbreaks are promptly dealt with and the sheep are not allowed at any period of the year to become badly affected. The mixing of clean and affected sheep, or their meeting through a wire fence, or when travelling on a public thoroughfare are fruitful sources of contamination. Sheep in poor condition,[1] or those suffering from constitutional weakness or bad management, yield to the insidious attacks of the parasite much more readily than robust animals in good condition. Fat sheep may contract it, but it is with difficulty. All sheep suffer in the end when fully and freely exposed to contamination. Others again, such as Welsh mountain sheep, yield more readily to treatment than many of the Lowland breeds. These are not features peculiar to this country, as in South Africa scabbed sheep in the dry Karoo are well known to be more easily dealt with than those on the moist grassy lands near the coast, and Long-wool sheep in the Argentine offer less difficulty in treatment than Merinos.

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[1] Starlings and jackdaws, which settle on the backs of sheep in search of the larger forms of ovine parasites, are capable of transmitting scab from one flock to another, located at considerable distances apart, and an

Dip Materials.

The **poisons present** in all the common effective dips resolve themselves into a limited number of well-known chemical substances which, in wholesale quantities, can be procured at very moderate prices. For a long time they were essentially four—arsenic, sulphur, decoctions of tobacco, and carbolic acid. For 100 sheep, 10 lb. of hellebore (boiled for an hour) and stavesacre are sometimes used with excellent results as supplementary ingredients; and corrosive sublimate (perchloride of mercury) is recommended by Finlay Dun[2] as a cure for scab. This last, however, is so much more dangerous to the animals than arsenic that it is rarely resorted to.

A dip made with **white arsenic** (rendered soluble by boiling in 2·5 gallons of water, 45 lb. of commercial arsenic (As_2O_3) with 45 lb. of carbonate of soda crystals, to form the arsenite of soda,[3] without leaving any free alkali) is immediately effective in destroying the mature *acari* of scab, which hatch out from the uninjured eggs in a few days after dipping. It is not dangerous to the sheep if used in moderate quantities, say 2 lb. to 100 gallons of water. A case is recorded of sheep losing their teats after being dipped in a solution of double

extensive sheep farmer has suggested to us that flies might also, as in other cases of infection, carry the parasites from one sheep to another, and further complicate the question of the unexplained causes of outbreaks.

[1] Some authorities say especially when beginning to thrive.

[2] *Veterinary Medicines*, 8th ed., 1892.

[3] Cold water is then added to bring the amount up to 9 gallons of a standard solution containing about 5 lb. arsenic per gallon.

this strength. It is best for the farmer to purchase arsenic in solution, when it can be got at moderate cost, each gallon containing 5 lb. of arsenic. Cold water is then added to the concentrated liquid, to reduce the solution to the standard strength.

Sulphur is commonly used in this country in the insoluble form of the flowers of sulphur, which merely mixes with the other dip materials. It adheres to the wool and exercises a prolonged influence—the odour evolved keeping off maggot-flies during summer. Whether administered internally or applied externally, it is extremely searching in its action, and its presence is inimical to the development of most of the common forms of ovine parasites. Its chief drawback is the difficulty of mixing it in the dip so that each sheep shall receive a proper proportion. This is partially overcome by associating with it an equal weight or more of black (soft) soap, which also aids in dissolving arsenic. In Australia, where sulphur has been most effective in the extermination of scab when skilfully handled, and in America and South Africa, where it has been largely used, it is dissolved in combination with lime—25 lb. of sulphur and 18 lb. of slaked lime being made into the consistency of thick cream, and then boiled for twenty minutes in 20 gallons of water, when the sulphide and hyposulphite of calcium form. The resulting orange-coloured liquid is finally mixed with sufficient cold water to make it up to 100 gallons. The chief drawback to this dip is the difficulty of preparing in a short space of time a sufficient quantity to dip large numbers of sheep—say 25,000 to 100,000. The authorities in the Orange River Colony have (1904) emphasised another possible objection by prohibiting its use on account of the serious damage done by lime to the wool when the material is not properly made.

Tobacco is the most valuable of the dip materials that are not poisonous to sheep. Although not so immediate in its action in killing living parasites as arsenic or carbolic, it is so distasteful to them that it is the best of all the common dipping materials for preventing living *acari* from gaining access to the fleece. The existing Customs restrictions on the importation of certain useful forms of tobacco for dipping purposes are so unnecessary and so troublesome that the matter requires reconsideration. Before leaf-tobacco for dipping purposes can be manufactured in a bonded warehouse, under, practically, almost impossible conditions, it has to be mixed with impurities which render it unsuitable for other uses — for every 100 lb. of dry leaf-tobacco, 10 lb. of blue vitriol, 15 lb. of common salt, and 2 lb. of oil of turpentine. Ground tobacco, which can be bought in America at very moderate prices, is not admitted into this country — a grievance of which farmers have just cause to complain. The quality of the manufactured products of tobacco, in the form of paste and juice, is not always reliable.[1]

Carbolic acid[2] is effective in killing living parasites on sheep; but, if used strong enough to destroy the eggs of the scab-mites by coagulating the albumen in their substance, it is liable to irritate the skins of the sheep, and give such a shock to their nervous systems that the function of digestion is suspended, and the animals become hoven, as in tympanitis, and a speedy death can only be prevented by immediate washing in clean water. But when used in moderate quantities—viz., 1 gallon to 50 or 75 gallons of water—the mixture is so safe that it has been designated by the trade "non-poisonous" dip. Only cresylic acid of 95 per cent. to 97 per cent. purity is tolerably free from the risk of staining the fleeces of white-wooled sheep, as the lower grades contain pitch-oil, and are so irregular in strength that uniformity of results are difficult to obtain. But from the best manufacturers of "carbolic" sheep-dip this ingredient of a mixed dip can be purchased at a reasonable price, in 40-gallon casks of such a strength that 1 gallon of the material is sufficient for 75 gallons of water. The ordinary farmer could not save much by preparing the carbolic acid at home. In conjunction with arsenic its effects are most satisfactory. It is not good practice to use a strong carbolic dip, or, in fact, any dip twice within fourteen days, as lambs especially are liable to swell in the limbs as if foundered; but a carbolic dip may precede or follow an arsenic or other dip within eighteen or twenty-one days with safety and with excellent results.

Pitch-oil we do not recommend for general use, owing to the objections which wool manufacturers have to its injurious effects on the colour and dyeing properties of the wool. It is a product of very irregular composition, got by fractional distillation of tar from blast-furnaces or gas-works. It is also known in the oil trade as lusuline, torch-oil, and black naphtha, and the valuable property which it possesses is mainly derived from cresol. The lower grades of pitch-oil should not be used for dipping purposes under any circumstances. Even the purest samples which come clear from the still, darken on being kept a couple of months, although no sediment settles. The naphthalene which it contains is largely accountable for the discoloration, and it is believed to exercise an injurious influence upon the wool when the oil is not thoroughly saponified by mixing with from 3 to 6 lb. of black soap per gallon. This risk is minimised, if not wholly removed, when the oil and soap are mixed a few months before use, so that no crystallisation can take place; and the bath is kept at a temperature of not less than 60°, or still better, 70° or 80° F.; and, if the deposit from oil that has been exposed to frosty weather be removed before use, the dip ingredients carefully mixed, and the contents of the bath repeatedly and thoroughly stirred. Pitch-oil is of no value as a preventive of fly-blowing. The increase in the prices of burning oils and of carbolic acid, which are made from coal-tar, may check the use of pitch-oil as a dipping material.

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[1] For **Prescriptions of Dips** approved by the Board of Agriculture for sheep scab, see the Schedule attached to Sheep Scab Order for 1905 (No. 6879), and *The Journal of the Board of Agriculture*, No 11, p. 662, 1904-5.

[2] For the benefit of the ordinary reader we have retained the familiar and industrially more common name carbolic acid (phenol), although the cheaper and for the present purpose more suitable, nearly allied phenolic substance, cresol or cresylic acid (95 to 97 per cent. purity), is preferred to crude carbolic acid by the best so-called non-poisonous (carbolic) dip-makers. Cresol is liquid at ordinary temperatures, while carbolic acid is solid, although more soluble in cold water in the proportion of 11 to 29. Cresol is generally considered to be superior to carbolic acid as an antiseptic and vermin-killer, and Allen speaks of it as on the whole less irritating to the skin, especially after the separation of an acrid phenoloid body of high boiling point. For details, see *Coal-Tar and Ammonia*, by Professor Lunge, published by Gurney & Jackson, London; and a paper by Alfred W. Allen in *The Journal of the Society of Chemical Industry*, vol. ix., 1890.

Carbolic acid and other crude coal-tar products used by unskilled people as sheep-dips, are very liable to poison sheep by absorption. Though a light scum floats on the top, the danger is in the heavy products that sink near to the bottom and remain in an undiluted condition. "The *symptoms* are rapid breathing followed by paralysis, convulsions, and death. *Treatment.*—Wash off the acid as quickly as possible, and give a dose of Glauber's salts."

A **stronger solution** of any one of the above-named poisonous substances would destroy the living external parasites which infest sheep, but at the risk of injury to the sheep. The desired result can be effectually secured without danger to the animals by the use of dips made up of combinations of two or more of these substances in the safe proportions just stated. The immediate action of arsenic and of carbolic dips can be fortified by the addition of sulphur or tobacco. Either addition also prolongs the action of a dip, and thereby materially adds to its ultimate efficiency. Considerable variety can thus be obtained, and suitable combinations selected to combat special difficulties that present themselves in different districts. While tobacco, which adds materially to the cost of a dip, may be useful among Blackface sheep, where there is the danger of a few undipped sheep mixing with those which have been dipped, it may be left out in those parts of the country where sheep can be confined after dipping within enclosures where chances of contamination are few. Tobacco is liable to discolour white wool and reduce its value. The amount of dip material necessary in autumn for 100 sheep may be stated in round figures at 80 gallons for mountain breeds and 100 gallons for the larger lowland sheep, smaller amounts being sufficient in both instances for recently shorn sheep and for lambs.

Caution.—The various simple ingredients named may be employed by the few men who have studied chemistry, to make effective dips at home at a less cost than patent dips, but the ordinary farmer is strongly recommended in his own pecuniary interest, as well as on the score of humanity, not to attempt to combine materials the nature of which he does not understand, but to use the ready-made dips which experiment has shown to suit his purpose best. The manufacture of sheep-dip is a complicated technical process, which involves the application of wide knowledge and experience to produce an article which will do its work effectively, and at the same time not injure the wool or endanger the life of the sheep.

The question as to **what dips to avoid** has been admirably focussed in a *brochure* by S. B. Hollings, Calverley, near Leeds.[1] He advocates the exclusive use of arsenic and sulphur dips, stating, "arsenic has proved so effective, that at least two-thirds of the entire arsenic production of the world is used for insecticides." Quoting W. J. Austin, Norandoo, Victoria, who as a test treated a flock of sheep with a crude, and another flock with a prepared arsenical dip, he says: "The wool from the prepared dip weighed an average of 4 oz. per fleece heavier, and realised a halfpenny per lb. more than the rest." He adds: "Crude arsenical wools are harsh, and a bad colour. Those with a prepared dip are brighter, softer, and better grown. Every Bradford man will bear me out when I say, that wool affected by any of the evils associated with the use of alkaline or crude arsenic is *always* more or less wanting in colour, texture, and weight."

Important work has been done in the development of a new agent for the destruction of agricultural pests, and it has proved effective against sheep parasites. During the war a plague of maggots, infesting the unburied bodies in No Man's Land in France and Belgium, led to an investigation by a British Government Department, and a search for an effective insecticide. A public appeal through the Scientific Press led to hundreds of samples being submitted for trial. J. Wilson Dougal, B.Sc. (Edin.), Analytical Chemist, Spring

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[1] *Damaged Wool and its Relation to Sheep-Dips, from the Bradford Standpoint.* Bradford: William Byles & Sons, Printers, Piccadilly, 1903.

Gardens, Edinburgh, having six years before found the **chlorohydrocarbons** of the **ethane** and **ethylene series** effective in this field of research, sent in samples, specially prepared for the purpose, of many types of the above, and these proved to be of all the samples submitted the most deadly. Nicotine is their only rival, and it is out of the running on account of its cost. Ethane is very lethal, disrupting the functioning of the living cell by oxidation of the vital fluids of either parasitic plant or animal. The material may be prepared inexpensively under scientific control, for application in various forms, viz., as vapour, which has its dangers to the unskilled operator, and in solutions of various kinds and strengths according to the object aimed at.

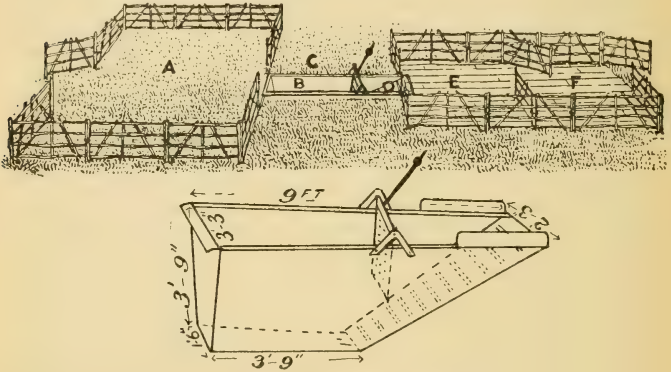

FIG. 94.—COOPER'S ORDINARY SWIM BATH.

A, Mustering fold. B, The bath. C, Place for a man with a crutch. D, Exit. EF, The draining pens.

This effectiveness of chlorohydrocarbons on parasites of sheep has led to the expectation that the material will be also applicable to land pests, and to the general sanitation of the farmyard.

Instructions for building a Swim Bath in Brick and Cement.—The *bath* should be 9 ft. long, 3 ft. 3 in. wide, and 3 ft. 10 in. deep. Details are given on sketch, p. 729, which is drawn to scale, and will be found sufficient to guide a bricklayer or concrete builder in making the bath. The *exit slope* ought to be 18 in. wide at the bottom, opening to 2 ft. 6 in. at the top. The *draining pen* should slope towards the centre, and also towards the bath: it may be increased to any size desired. The larger it is, the more complete is the draining of the sheep.

A dipper consists of a mustering fold, a brick or a concrete tank, and a dripper (see plan, p. 731). The old-fashioned tub into which sheep were turned on their backs is not approved, for heavy sheep are liable to be injured in lifting. The best fixed tank on a large scale is made wide enough to permit sheep to swim through without being able to turn—15 to

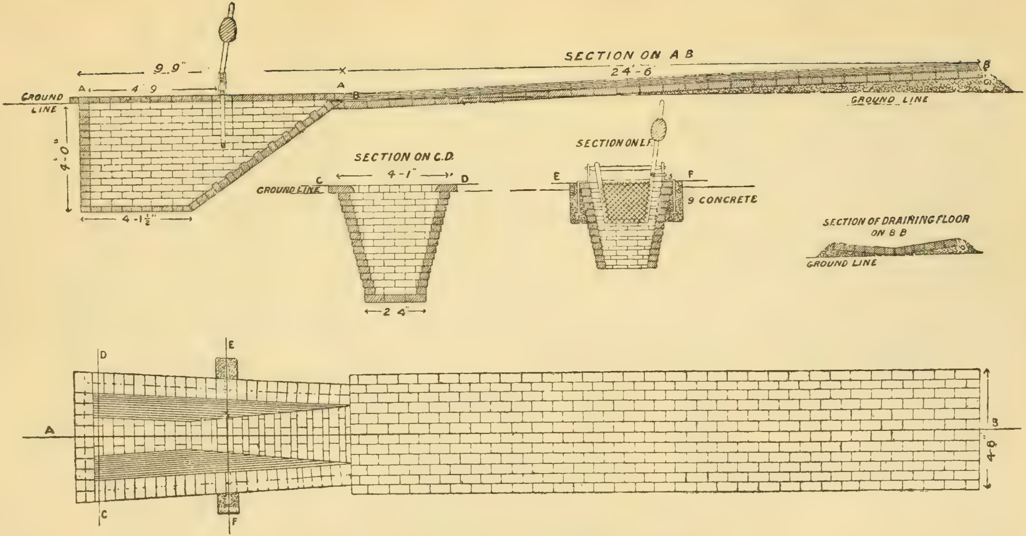

FIG. 95.—PLAN AND SECTIONS FOR BUILDING SWIM BATH.

(*Drawn by Wm. Cooper & Nephews.*)

The bath should be gauged. Nail a strip of wood to the side, measure 140 gallons of water into the bath, and cut a mark into the wood exactly at the water edge. Add another 20 gallons and make another cut; and so on until the bath is full; with a fresh mark for every 20 gallons. The measurements should afterwards be cut or burned into the gauge. This will save measuring the water with a pail each time the bath is used.

20 ft. long at the top (in the Colonies 30 to 40 ft. or more), 5 ft. deep at the plunge-end and for one-third of its length, and then gradually sloping out to the dripper at the exit-end. Sheep are pushed forward and plunged one by one over the head. They close their lips, and on coming up swim slowly through, remaining in the tank about a minute, or till the wool is thoroughly soaked. The men employed are liable to let them go too quickly, and one should be stationed at a convenient place with a forked stick or crutch to regulate the rate at which the sheep swim and to sink them over the head in the dip. The excess of dip material runs off the sheep to the floor of the dripper, and back to a settling pool, thence to the tank, towards which the floor of the dripper slopes. After dripping, to avoid soiling or poisoning the pasture, the sheep go for a time into a fold, or a bare paddock where there is no grass.

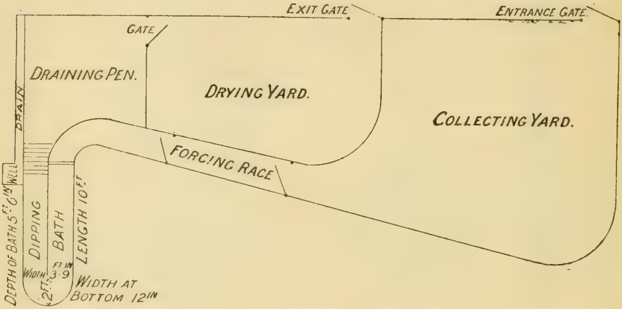

FIG. 96.—THE DIVIDED SWIM BATH.
Designed to effect a great saving in cost of construction.

Quantities of Timber and Iron required for Bath, p. 731.

Framing to carry Iron.		19—8 ft. posts.
	60 . .	12—10 ft. (super) lengths. 3 in. × 2 in.
	30 . .	4—18 ft. lengths, and 4—12 ft. lengths. 3 in. × 1 in.
Bearers for Floor Joists.	120 . .	4—18 ft. lengths, and 4—12 ft. lengths. 4 in. × 3 in.
Floor Joists.	220 . .	20—10 ft. lengths, 6 in. × 2 in.
Batten Carriers.	120 . .	8—18 ft. lengths, and 8—12 ft. lengths. 6 in. × 1 in.
	630 super ft. heart timber.	
Side Rails.	516 . .	16—18 ft. lengths, and 16—14 ft. lengths for the 4 sides, and 8—12 ft. lengths, and 8—10 ft. lengths for the two ends 6 in. × $1\frac{1}{2}$ in.
2-in. Battens for Floors & Gates		Sold in lineal quantities, 2 in. × 1 in. in 150 18 ft. lengths. Total 2700 feet.

(135—18 ft. lengths will be required for the floor, and 15 lengths for gates, etc.
Battens set about $\frac{1}{4}$ in. apart.)
Tar should be plentifully used throughout to preserve the timber.

Galvanised Iron under Draining Pens.	32—10 ft. sheets 26 gauge. About 80 ft. of 5 in. spouting O. G.,[1] with two elbow joints.

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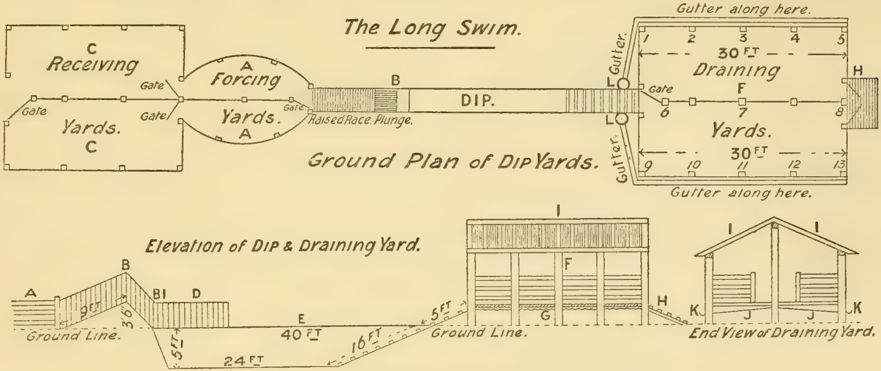
[1] Ogee, an architectural term for a particular S-like form of moulding (or spouting).

FIG. 97.—COMPLETE PLAN AND ELEVATION OF AN AVERAGE DIPPING BATH FOR LARGE FLOCKS. (*See p.* 730.)



EXPLANATORY NOTES.

A, Forcing yards. B, Raised race and plunge. C, Receiving yards. D, Splash boards, 10 ft. long, 2 ft. high. (Sheets galvanised iron.) E, Dip, 40 ft. for Merinos, and 60 ft. for Cross-breds and Long-wools × 2 ft. × 9 in., 5 ft. deep. F, Draining yards. G, Galvanised iron under grating of draining yard to collect drainings. H, Going-out stage. I, Roof: corrugated iron, brushwood, or tarpaulins. L, Strainers to separate droppings and allow only clean liquid to return to bath.

N.B.—Roofing on draining sheds is only necessary when dipping is done in very hot weather in hot climates.

Memo.—The shoot for the plunge requires to be covered in with an old woolpack, and the end of shoot, marked B1, should have an old bag nailed across at top to hang as a curtain, so as to prevent sheep from seeing the liquid in dip. As sheep slide down they push the bag aside and fall into dip. Instead of the above forcing race, a narrow race may be used, or the "walking-in" plan may be adopted.

An **up-to-date sheep dipper** is shown in Fig. 76, the plan of a "Modern Sheep Folds," etc., p. 632. In the centre of the right-hand side of the plan is the longitudinal section of a 20-foot dipper drawn to scale. Above it, placed for convenience in the centre of the "pen for sheep after dipping," is a cross section A-B, showing the deep end of the dipper to the right, and the pit into which the balancing weight descends which supports a platform in a horizontal position with trellis work behind it to indicate the position of a decoy pen to attract the sheep on to the balanced platform. The weight of the sheep carries down the platform as indicated by the dotted lines marking the rounded side of a quadrant below it, and the sheep are precipitated into the bath. Some of the oldest ewes of the wilder and more wary of our mountain breeds may not be easily taken in by the decoy pen. A larger bird's-eye view of the bath and the parts round section A, B, on a scale attached, is shown below the longitudinal section, and the complete ground plan, on the scale of the rest of the figure, is seen at the high right corner of the figure.

Wallace's Patent Dipper (Plate CCXIII.) has a sunk galvanised iron tank or bath, into which a cage holding a sheep is lowered and elevated by rack and pinion. The inlet door closes automatically to prevent a second sheep from following. As the cage descends, the dip surges through perforated side plates, and thoroughly saturates the fleece. The exit door automatically lifts up when the cage on being raised reaches a certain point, and the animal is free to pass out. When it is clear of the cage, the door closes and stops the sheep stepping in at that end. A supply of mixed dip is placed in a barrel-shaped tank by the side of the dipper, and a uniform quantity of material is maintained in the bath by a regulating crane. A weight to counterbalance the cage, attached to a wire rope passing over a pulley, makes the raising and lowering of it easy. The weight is made to travel up and down inside the supply tank, keeping the dip at a uniform strength by agitation. The drippings from the sheep are collected on a concrete floor and returned to a settling box on their way back to the bath.[1]

Pouring is done by running a concentrated solution of, say, 5 gallons per score (against 20 gallons used in dipping) into "sheds" or partings made by two hands, at intervals, in the wool along the back, sides, and belly of the sheep. This is more effectual than dipping in a case of scab, but is more costly, and, for ordinary purposes, unnecessary.

Smearing[2] with a mixture of equal parts of American or Archangel tar, and grease, or better, rancid butter, is a method of waterproofing the wool and destroying parasites that was at one time very largely and successfully practised in exposed hill districts, especially in the Highlands of Scotland and the North of England. It encourages the growth of wool more than any dip yet used, but wool is not so high in price that the increase will repay the extra cost of the operation. A limited number, however, of crofters in the Highlands and small farmers in the North of England still practise it. It darkens the wool and often gives sheep, especially if lean, a "back-set" until the tar rises a little from the skin. Smearing should not be done before the middle of October, as a strong sun melts the smear, and it runs towards the points of the wool if it does not drip off, and moreover the sheep become fevered. In carrying out the process the smear should be laid well to the skin at the bottoms of partings in the wool, and as little as possible on it. The usual practice in preparing the material is to thoroughly mix in a tub, a fortnight before the operation, as much as will be sufficient for forty mountain sheep, viz., 9 pints (Scotch[1]) of tar with 9 pints of butter, the latter melted to enable it to mix with the tar. Tar is a mild blister if applied alone to an animal's skin, and the grease is intended to dilute it. Hard grease, such as butter, also gives the tar consistency. A man smears twenty sheep per day, and used to receive from 2s. 6d. to 3s. for the work, besides food.

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[1] See also Leaflets of the Board of Agriculture and Fisheries, No. 61, "Sheep Scab," and No. 145, "Sheep Dipping."

[2] Acknowledgment is made for many of the facts on this subject to Stephen Brown, Esq., of Borland, Lockerbie, N.B., formerly Killilan, W. Ross.

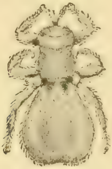

FIG. 98.—THE SHEEP KADE, *Melophagus ovinus* (♀), ventral.

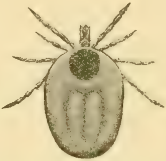

FIG. 99.—THE (GRASS) TICK, *Ixodes ricinus* (♀), dorsal surface.

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[1] A Scotch pint is about equivalent to $\frac{3}{8}$ of an imperial gallon = 3 pints English.

CHAPTER XXXIV

MANAGEMENT OF SHEEP (*continued*)—INTERNAL PARASITES

Internal Parasites—Two Classes of Worms: Cestode and Nematode—Tape-worm producing "Gid"—Liver-fluke producing Rot—Strongylus producing Husk or Hoose—Strongylus in Abomasum—Sheep Bot-Fly producing Bots in the Head.

INTERNAL **Parasites.**—There are **two classes of worms** of which the intestines of domestic animals are the habitat, namely—the *Cestode* or tape-worms, and the *Nematode* or round worms. The former require an intermediate host or "bearer" to complete the cycle of their life-history, but the whole life period of the latter is completed in the one host.

"**Three Cestode worms** are found in ruminants—*Tænia expansa*, *T. denticulata*, and *T. alba*. The first is the largest tape-worm known, reaching a length of 40 ft. *T. denticulata* is only about 18 in., and *T. alba* about 9 ft. long; all are unarmed, so they cannot attach themselves to the walls of the intestine, and are therefore easily expelled by a simple purgative; they are not common in Britain, and cause little functional derangement; but on the Continent, in Australia and in America, attacks of *T. expansa* have assumed an epidemic form, producing diarrhœa and emaciation, especially in lambs. *T. expansa* is also found in this country associated with nematode worms, in the stomach and intestines of sheep, generally of the species *Strongylus contortus*,[1] a wire-worm about $\frac{1}{6}$ to $\frac{1}{3}$ of an inch in length,[2] *Trichocephalus affinis*, or whip worm, and *Strongylus filaria*, one of the worms which cause hoose in sheep. They produce a diarrhœa which, if not treated, often proves fatal. The fæces are of a brownish colour and very liquid, and emaciation is extreme. A *common treatment* is to give turpentine followed by tonics, sulphate of iron, and powdered gentian root, a teaspoonful of each ingredient to each sheep in their trough food." (See also Cooper's remedy on p. 680, *May*.)

A sheep is very easily choked, and turpentine is one of the most dangerous drugs to administer, not only from its highly irritating and searching nature (liable to cause death by spasmodic closing of the mouth of the windpipe should it enter), but from the fact that it will hardly mix with any ordinary drench. The administration must be made with great care. To ensure safety, the turpentine (¼ to ½ oz.) should be thoroughly soaked into a little dry meal, and this again mixed with cold gruel, oil, or even water.

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[1] **Young Cattle** also suffer from the attack of a nematode worm similar to *Strongylus contortus*, but larger; these worms fix themselves to the walls of the abomasum, or fourth stomach, and produce similar effects to those seen in sheep, and the *treatment* is the same as for sheep. *Cysticercus bovis* is the hydatid form of the *Tænia media cannulata* of man. This cystic form is found in the muscle and connective tissue of cattle, and gives rise to what is known as "measly beef."

[2] Described and illustrated at pp. 385-8 of the Author's *Farming Industries of Cape Colony*.

Should scour be the result of an overfeed of succulent grass, or be due to a sudden change of green food, the primary purgative and the secondary astringent action of the turpentine is generally what is wanted. Laxity of the bowels, when there is no positive derangement of system, is easily remedied by giving concentrated dry food, as cakes and meal, or a run on a sainfoin ley.

One stage of the development of *Tænia cænurus*, the tape-worm of the dog and fox, is passed in the brains of sheep, causing "**gid**" or "**sturdy**" (from the Norman-French, *étourdi*). "The segments are evacuated by dogs on the pastures, and the eggs, picked up by sheep while grazing, are hatched in the stomach. The embryos make their way by the blood-stream to the brain, where they form cysts, which gradually enlarge." The remedies are of more consequence to farmers who keep lean stock, and to ram-breeders, than to those who can send without much loss an affected animal directly to the fat market. A ram that has been cured of sturdy is none the worse afterwards for breeding purposes. The seat of disease is on the surface of the brain, at its base, or, in the Author's experience, most frequently in the lateral ventricles. These cavities are situated one on each side of the forward brain, and there a cyst, or in common language a "water-bag," containing many young tape-worms, develops. This presses against the brain, causing absorption of the contiguous parts of that organ, and usually a thinning and softening of the skull in one or other of the hollows on the crown of the head, immediately in front of a line drawn between the ears, where the skull is comparatively thin. Partial paralysis accompanies the later stages of the development of the malady, and the sheep becomes blind on, and circles to, the side opposite that on which the cyst inclines.[1] Boring with a trocar and cannula to break, and, if possible, to extract the "bleb" and its contents, is in such a case easy. When the seat of the disease is far back in the brain, the skull is thicker over the affected part, and there is not sufficient time, before

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[1] In some cases the animal walks straight forward with head depressed, running against everything in its way, and frequently falling. Then it is likely that the parasite is attached to the *Corpus callosum;* if the direction is forward with head elevated, sometimes reeling, the parasite will be found on the *Cerebellum*, or in the fourth ventricle.—PENNINGTON.

death is liable to occur, for the bone to become sufficiently thin and soft. In Scotland this form of gid is known by the specific name of "thorter-ill." Piercing leaves little pieces of bone, fractured from the skull, on the surface of the brain, which, although the disease may be cured, produce within a few days suppuration, usually resulting in death. The late Principal Wm. Williams recommended in place of a piercer the use of a trephine (a little circular saw), to remove a minute round piece of bone. The skin is bared from the skull immediately over the spot to which the movements of the sheep direct suspicion. All detached pieces of bone are washed carefully away before the membrane covering the brain is broken. Piercing in the usual way through the brain to reach the bag is then performed with comparative safety. When the disorder is located in the forehead, or in the case of rams with skulls too thick to soften, the old remedy described by Youatt of passing a thin skewer or sharp steel wire up the nostril and right into the brain-box to reach and penetrate the water-bag, is the readiest and most simple, and often effective, means for a shepherd to employ. The wire is kept close up against the roof of the nostril, and should be only stopped by the skull under the forehead. After it has penetrated the skull, it should be partially withdrawn and returned two or three times in a slightly different direction each time to give it a greater chance of success. If no benefit or only partial success follows within three or four days, the operation should be repeated, and this may require to be done two or three times more before a complete cure is effected. In districts which are much subject to this disease, to ensure the destruction of the embryo worms the skulls of dead sheep should be broken up and their carcases buried with quicklime in a compost heap. The dogs ought also to be dosed regularly with ½ dram to 1 dram of areca nut, which frees them from tape-worms, and lessens the risk of sheep, while feeding on grass, picking up segments of the worms passed by dogs.

Darnel rye-grass (*Lolium temulentum*), an annual weed in some pastures, is reputed to produce in sheep brain symptoms similar to those of sturdy. This rare grass may be distinguished from common rye grass by the outer glume being longer than the spikelet.

Liver Rot.—There have been enormous losses in this country from "rot" in sheep, the work of a *trematode* worm, *Distomum hepaticum* or *Fasciola hepatica*, which is the cause of the disease. The "fluke," seldom more than an inch long, broad, thin, flat, and flounder-like, attaches itself by a sucker on the under surface. Sometimes hundreds have been found in the liver ducts of one sheep. Professor Leuckart in

Germany, and A. P. Thomas in this country, traced, almost simultaneously, the life-history of this parasite through all its different stages, and published independent accounts of their investigations in 1882.[1] They find that the fluke lives for a time, and changes its form, in the body of a minute shell-snail, *Limnæus truncatulus*, which thrives in excessively wet places.

The sequence of changes in the animal system is originated by irritation, and consequent inflammation, beginning in the biliary ducts, and extending through the liver, interfering with the performance of its functions in aid of digestion. The stomach next becomes weak or disordered, poor and imperfect blood is formed, and time is all that is necessary to exaggerate the results into a persistent anæmia, which ultimately ends in death.

The great means of prevention are—to surface- or under-drain; to keep sheep from pasturing on flooded land; to have lumps of rock salt about the pasture; and to give liberal feeding. One fact in connection with this disease is worthy of special notice. The presence of flukes in the liver, even in considerable numbers, does not necessitate the appearance of the dangerous symptoms described. Few sheep are killed in Galloway, a large district in the south-west of Scotland without flukes being found in their livers: yet death from "rot" to any extent is very exceptional. When sheep first become affected, the stimulating influence on the liver makes them thrive rapidly for a time. This has led to the practice by some feeders of putting fattening sheep on flooded land to be "fluked." Rot certainly has done much damage among breeding flocks, and will continue to do so on damp, undrained land in wet seasons, like that of 1879, but there are good reasons to believe that many of the deaths from so-called "rot" have been from a very different cause, which is described under lung disease at p. 741. An extremely widespread outbreak of fluke occurred in 1920-21 among sheep in North Wales, especially in Merionethshire, where flocks were decimated by the malady. Medicinal treatment was not of much avail, but best results were obtained by the administration of extract of male shield fern and oil of chenopodium.

Husk or **Hoose** is a bronchial catarrh, the result of the irritating action of a number of long, hair-like, round white worms, *Strongylus filaria*, in the bronchial tubes. It is most common amongst lambs, if they be pastured on land recently occupied by sheep, as they pick up with their food the eggs (*ova*) dropped by their predecessors. The attack is evinced by a peculiar husky cough, made worse by exertion; by an unthrifty appearance; and by a mucous discharge from the nostrils, which often contains the worms or their eggs. Weak animals, and those which develop large numbers of worms, frequently die. To prevent the occurrence of this malady, sheep should be kept in good thriving condition, and young stock should never be put on land previously soiled by sheep. *Remedial treatment* is directed towards the destruction of the worms. A turpentine drench has been long considered efficacious; $\frac{1}{8}$ to $\frac{1}{4}$ oz. at a time being given to a lamb, and this repeated twice, with an interval of three days between the administrations. Turpentine is a most poisonous and dangerous drug if given too frequently, or in too large quantities, to sheep, as it sets up inflammation in nearly all the important organs of the abdomen; and most sheep thus poisoned will die within a few days, after evincing, by dullness, restlessness, and the grinding of their teeth, that they are suffering severe internal pain. A purgative only aggravates the condition, and hastens death. Injections of tepid water may be employed to allay pain and relieve the constipated condition which accompanies turpentine poisoning.

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[1] See *Journal of the Royal Agricultural Society* for that year.

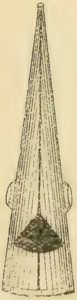

FIG. 100.—SHEEP DRENCHING-TIN.

A simple **drenching-tin** for sheep, the invention of one Armstrong, was described as follows in the *Sydney Mail*:—

> "It is a tin cone, about 8 in. in length, about $1\frac{1}{2}$ in. through at the butt, which is closed. At the mouth or narrow end, which is about $\frac{3}{8}$ in. across, and open, the sharp edge is covered by a ring, so that it will not injure the sheep's mouth. Near the base of the cone, and about $1\frac{1}{4}$ in. from the end, there is an orifice 1 in. wide. The sheep are held, and the operator having the drench stuff in a bucket, dips the drencher, wide end down, into the mixture. By this action he instantaneously admits into the tin about one ounce of the drench, and raising it he is ready to pour the dose down the throat of the sheep. The cone is, in fact, a measure and drench combined. The large opening freely admits the air, the want of which is the great difficulty met with when a bottle is used. Six or seven men can easily drench three thousand weaners in a day."

The recent and more approved method of treatment is the injection, directly into the trachea, of $\frac{1}{2}$ to 1 drachm of a turpentine and carbolic acid mixture, fully detailed at p. 262.

Strongyles in Abomasum (Fourth Stomach of Sheep).—A thread-like worm (*Strongylus contortus*) found in enormous numbers in the fourth stomach of lambs and young sheep, is responsible for great losses among these animals. The principal symptoms shown by affected sheep are diarrhœa, anæmia, wasting, and weakness. The diagnosis of the condition is not very difficult. The abomasum or fourth stomach should be carefully opened and, after the contents have been allowed to settle, if the worms are present in numbers their wriggling will disturb the surface of the liquid. A small quantity of the liquid contents on a glass slide, examined under a low power of the microscope, reveals the strongyles very readily in aggravated cases.

Lands subject to inundation and wet ground generally are the places where the disease is observed, and the malady is often associated with lung worm (*Strongylus filaria*) and fluke.

Infection is brought about by the sheep at pasture eating plants contaminated by the larvæ of Strongyles; the drinking water is also a possible source of contagion.

Arrived in the stomach, the strongyles bore into the mucous membrane and suck the blood, so that the disturbance of health is to a great extent related to the number of parasites present. Besides the loss of blood, however, it is probable that toxic products, originating from the strongyles, produce after absorption, deleterious effects. Also the injured surface of the mucous membrane is liable to attack from organisms present in the stomach.

Treatment.—It is not much good to dose the affected sheep with worm medicines if they are still kept on pastures where they are liable to become reinfected; hence a change of pasture is most essential, and, since sheep in backward condition are much more liable to serious invasion by strongyles than those in a thriving state, hay and artificial food are valuable preventives.

The medicines usually prescribed are turpentine (one teaspoonful in milk), thymol (40 grains), sulphate of copper (6 grains in water), arsenic (3 grains). However, several experienced observers are opposed to the administration of worm medicines, and state that in districts where the malady prevails it is sufficient, when weaning lambs, to provide them with dry food (crushed oats and hay). A lick of sulphate of iron, salt, and gentian is said to be of service.

The **Sheep Bot-fly** (*Œstrus ovis*) lays its eggs in the nostrils of sheep from the middle of May to the end of July, and, on hatching, the larvæ crawl up the nostrils. The fly causes as much excitement in a flock of sheep as the warble-fly does among cattle. The sheep become most uneasy, keep their noses close to the ground and bury them in the dust. Sometimes they scatter in all directions to find shelter. At other times they form into a dense pack, and those on the outside stand with their heads in under cover.

"The larvæ crawl from the nostrils into the sinuses of the skull. Here they cause irritation and inflammation of the lining membrane, with the result that the animal has a discharge from the nostrils, and sneezes and coughs."

A few larvæ do little harm, but if they are in great numbers the constant irritation produces loss of condition and emaciation.

Treatment.—Fumigate the nostrils with tobacco smoke to dislodge the larvæ.

In badly affected pastures two or three furrows may be ploughed up, in which the sheep can bury their nostrils when they fear attack, or their feeding troughs may be smeared with tar, so that, while feeding, their noses become smeared, and this prevents the flies settling to lay eggs.

CHAPTER XXXV

MANAGEMENT OF SHEEP (*continued*)—DISEASES

Lung Disease—Braxy—Trembling or "Loupin' Ill"—"Scrapie"—Double-scope — Temporary Blindness — Bacillus of Necrosis — Foot-rot — Blotches—Dew-rot—Poisoning by Mercury and Copper.

LUNG **Disease.**—Cattle are subject to an infectious lung disease; goats have been found liable to a disease of the same nature at the Cape; and the Author has proved to his satisfaction that sheep also take lung disease one from another, and die, under certain circumstances, in great numbers. It appears to possess very much the nature of a bad cold, and is more severe on old ewes and lambs than on other sheep. Should it break out in a flock during summer, or in fine, mild weather in winter, deaths are not numerous; but in a cold and stormy season, which aggravates the disease, one-third to one-half is no unusual proportion of a flock to die.

The symptoms are a violent and painful cough, which seems to give no relief. When seriously affected, the animal falls off from the others, and gradually stops feeding. The breathing becomes increasingly heavy and laboured, with heaving at the flank, and moaning in the later stages, evincing the presence of acute bronchitis with severe pain. The ears droop in a peculiar manner, and the head hangs down, while foam appears at the mouth, and a tough yellow mucus at the nose and eyes. None recover after these acute symptoms set in, and death supervenes generally about the third or fourth day. The *post-mortem* reveals a highly congested state of the air-passages, and large portions of the lungs, usually the upper lobes, are found to be solidified, so that they sink on being immersed in water.

The most efficacious treatment is to inject by the intra-tracheal syringe, shown at p. 262, 2 to 4 drams of the injection mixture there detailed, and to cover the backs by sewing to the wool with stocking-yarn pieces of strong canvas, 2 ft. or 2 ft. 3 in. square, which have been waterproofed by brushing one side with boiled linseed oil, to keep rain off and heat in; the sheep should also be liberally fed, and kept perfectly quiet in a well-sheltered place. Any attempt to drug or fumigate the affected animals increases the number of deaths. A few usually die of consumption some months after the acute stage of the disease has passed. The late Principal Williams and some other authorities believed that the origin of the disease above described is entirely parasitic, the special worm being *Strongylus filaria.* To the public the difference of opinion as to whether the disease is parasitic or infectious is of little moment, as the remedial treatment recommended in either case is the same. There exist weighty reasons for the statement that much of the death-rate from so-called "rot" in the United Kingdom in 1879 was really due to this disease, and not so much to the liver fluke as was supposed, although in many districts fluke was prevalent and most destructive.

Wm. R. Davis says (1907):—

"**Pneumo-enteritis** of the sheep, a disease classed by Nocard under the *hæmorrhagic septicæmias*, is not uncommon in this country; indeed, it occurs a good deal more frequently than is generally suspected. In the acute form the attack is very sudden; respiration becomes rapid, there is a frequent cough, a discharge, often bloody, escapes from the nostrils, the mucous membranes become purple, and spots may appear on the inside of the thighs. There is great distension of the abdomen, and after some hours, diarrhœa supervenes. The termination is usually death in a few days, sometimes even in a few hours. *Treatment.*—Medicine is useless; the pasture should be changed, salt and iron given internally to the sheep, and a dressing of salt applied to the land."

"In Asia Minor a contagious lung disease of goats has long been recognised. Whenever an outbreak occurs among the stock of the villagers, a strict cordon is drawn around the infected area until the destructive malady has ceased to exist. Some importations of Angora goats carried the disease to Cape Colony a few years ago, where it committed great havoc in 1881 and 1882, more especially in the districts of Somerset and Bedford. Several thousands of goats died. The mortality of an entire flock was at least equivalent to 90 per cent. in many places. Prompt measures were taken by the Cape Government to stamp out the disease by the slaughter of all animals on infected farms, and just compensation to the owners of flocks was awarded. In a little more than twelve months the plague was by this means stayed, and the disease is now unknown in the colony. The Dutch and English farmers called the malady *lung-ziekte*, or 'lung-sickness,' by which name contagious pleuro-pneumonia of cattle is known by them. They aver that the symptoms and *post-mortem* appearances were precisely like those of animals of the bovine race that have died of pleuro-pneumonia. The diseases, however, could not be the same. The 'lung-sickness' of goats was not communicable to cattle. Even sheep that cohabited with them enjoyed perfect immunity from the disease."—*Agricultural Gazette.*

Braxy or "**Sickness**" is a disease widely distributed in the United Kingdom, but assuming most serious proportions within the areas immediately influenced by the Gulf Stream—*i.e.*, the wetter areas—the West of England, Wales, the West Coast of Ireland, and the Western Highlands and Islands of Scotland. It is also prevalent, and causes a high death-rate, in Orkney, Shetland, the Faröes, Iceland, and the West Coast of Norway.

While it is as a sheep disease that Braxy is most serious, it is recognised in many districts among cattle, and the so-called "Bracken Sickness" of cattle which occurs in other Braxy areas, is probably identical. The disease is most frequently seen in sheep under a year old, and while cases may occur at practically all seasons of the year, autumn and early winter, especially October and November, are generally the time of greatest danger. On many grazings the death-rate among home wintered hoggs reaches 10 or even 20 per cent., and probably higher losses would be caused but for the practice of sending the hoggs away to arable or low ground districts for wintering.

Ordinary observation has established certain very definite facts: (1) the sheep (hoggs or tegs) that contract the disease are generally the fattest and the most thriving in the flock, and the better the average condition of the flock the more probable is a heavy loss. (2) Cases are almost invariably connected with sudden falls of temperature, and very specially with the occurrence of heavy deposits of hoar-frost. The grazings where loss is highest are generally in situations that render them frequently subject to such heavy hoar-frosts. (3) The consumption of luxuriant green grass, especially "tathy" or rank patches produced by the droppings of cattle, is very liable to cause the disease.

Braxy generally runs a very rapid course, so rapid that it is the exception to see an affected sheep alive unless the flock is under more than usually close observation. Under mountain conditions the sheep that have contracted the disease, probably in the early hours of the morning, are generally dead before the daylight makes observation possible. Putrefaction sets in very rapidly after death, and the abdomen becomes very much distended with gas. When the sheep is opened there is a characteristic offensive smell. The flesh is of a deep red colour, but can be, and frequently is, eaten with safety. The gigots are often cured by shepherds ("braxy hams") and rank as a delicacy among people accustomed from early youth to eat them.

When symptoms are observed the first are "a short quick step, followed by unsteady gait, and a tendency to lie down and get up suddenly." The blood becomes viscid and dark and stagnates in certain parts before death; so that bleeding, which is usually tried, is often impossible. To attempt bleeding and to make the animal move about are almost the sole remedial means at command, and that only in the early stages.

A bacillus (anaerobic and sporing) believed to be the specific organism of the disease was isolated by Ivar Nielsen in Norway in 1888, and a similar organism was found in Braxy carcases by Hamilton, working under the Braxy Committee of the Board of Agriculture, and described in the Report of the Committee in 1906. (Cd. 2932, 2933, 2934). In the Faröes a protective vaccine, a weak culture of Nielsen's organism, was introduced by Jensen in 1897, and has since been used with some measure of success. It is now, however, generally admitted that the anaerobic sporing type of bacillus is a putrefactive organism which invades the tissues from the intestines after death and which has nothing to do with the causation of the disease.

M'Gowan, in the *Transactions of the Highland and Agricultural Society*, 1915, has published the results of an extended inquiry into Braxy. He concludes that "the primary cause of the disease is the *Bacillus bipolaris septicus ovium*, or an organism of the group of hæmorrhagic septicæmia organisms, which are capable of producing very fatal disease in a large variety of animals. Organisms of this group are normally inhabitants of the mouth and nose of the sheep and may assume the capacity of producing disease when the vitality of the animal is lowered." He quotes as a parallel case that of pneumonia in man—the *pneumococcus* being an almost constant inhabitant of the human mouth, which is able to get a hold on the lungs only on the occurrence of a chill. The secondary cause of Braxy he believes to be the consumption of rank, succulent food by an animal in a thriving condition (*i.e.*, one with a vigorous appetite) when the food is frozen and especially when it is covered with hoar-frost.

A common *preventive treatment* used by shepherds is to drench the hoggs in the third week of September (*i.e.*, before the Braxy season), with a wineglassful of a mixture (strained through a cloth) of pigs' dung and milk after fasting for eighteen hours in a clean fold—about 1½ lb. of dung per score of hoggs. After treatment, fast for two hours before turning into clean foggage for two or three hours. The pig is fed on grass or cabbages and cows' milk for four days; the dung is gathered on the fifth day and mixed with fifteen times its volume of milk. The treatment is undoubtedly effective, but it reduces the condition of the hoggs—a serious disadvantage especially if the coming winter proves a trying one. M'Gowan believes that the dung, like Jensen's vaccine, acts simply by putting the animals "off the thrive"—*i.e.*, by reducing them to a much less vigorous condition. Acknowledgment is made to Wm. Martin, shepherd, Kirkdean, Dolphinton. In general, attention must be paid to the secondary causes of the disease. Sheep should be prevented as far as possible from eating succulent and frosted grass.

"**Loupin' ill**" is not certainly known away from Britain.[1] The **chief centres of attack**, which are unfortunately extending, are the western counties of Scotland, viz., Ross and Cromarty, Inverness, Argyll and the adjacent islands—including, in the Hebrides, the west centre of Lewis; a number of small areas in the central southern counties of Scotland; a large area in the north-west of England; and about a score of small centres in very divergent districts of the country including Wales. It prevails most on grassy uplands, especially those growing nard or mat-grass (*Nardus stricta*).

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[1] Zündell, V.S., Strassburg, describes a disease in lambs very similar to that of loupin' ill, in which an organism is found which, he says, "resembles the microscopic plant *Pleospora herbarum*."

Sheep, more especially before they are a year old, are most liable to die when moved from healthy to infected ground, and a fence or stream often separates the one area from the other. Deaths from several of the other diseases named are frequently wrongly attributed to loupin' ill. It exists in a chronic and in an acute form. "In the former, the sheep is usually convulsed at first, and afterwards more or less paralysed, lying sometimes for weeks unable to rise." The appetite is generally good, but few recover the power of their limbs. "Acute cases run their course to a fatal issue in a few hours, with symptoms of blood-poisoning." The disease has been long known, but its bacterial origin was unsuspected till 1881, when Principal Wm. Williams, working under the auspices of the Highland and Agricultural Society of Scotland, made the discovery that the grass tick (Fig. 99, p. 733) taken from trembling sheep contained organisms identical in appearance to those he found in the spinal fluid which he extracted from the vertebral column of affected animals. This exploded the theory of Brotherston, Botanist to the Highland Society's Louping-Ill Investigations Committee, that ergot was the cause. The investigations of the Departmental Committee did not confirm the belief in the **tick** as the **main carrier** of the disease, but "show that, at most, ticks can carry infection only under exceptional and accidental circumstances." The facts, however, remain that there is no loupin' ill on land where there are no ticks; its appearance on fresh ground has been concurrent with the advent of ticks; it appears at the seasons of the year when ticks are in evidence, generally in spring, but in exceptional places in the West Highlands also in autumn. When ticks are not numerous, or when they are killed by dipping the sheep on infected land, the occurrence of trembling is at a minimum. Similar blood-poisoning and paralysis have been traced to the bite of a tick in South Africa and in Queensland.[1] When the ticks there are sought for and removed, the animals usually regain the use of their limbs within a few hours.

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[1] See the Author's works, *The Rural Economy and Agriculture of Australia and New Zealand*, p. 333; and *The Farming Industries of Cape Colony*, p. 303.

The blood of affected sheep "was free from any organism," and inoculation with it failed to convey the disease. The liquid in the peritoneal cavity (or within the lining membrane of the belly) sometimes swarmed with the large bacillus, and was turbid. In the clear liquid, in which only a few organisms are present, turbidity developed in twenty-four hours. Turbid liquid inoculated subcutaneously into a healthy sheep usually kills it in a few hours, after much swelling of the inoculated limb. A little acetic acid simultaneously injected enhances the action of the bacillus, as it does that of "black-quarter." The bacterial character of the disease was definitely established by repeated inoculations with this liquid or with a culture of the bacillus found in it. It was then discovered that in certain fatal cases the bacillus sometimes swarmed in the intestine, where the tissues and cavities of the body were free; and also that, after being taken in by the sheep with its food, it might multiply and be evacuated in quantity with the dejecta without injuring the animal. Except during the loupin' ill season, the blood of a healthy sheep destroys the bacillus when it reaches it, but at springtime it grows freely in the blood. Chronic cases are brought about by the slow poisoning which supervenes when the resisting power of the blood is partially lost and the invasion of the cavity becomes gradual. "Nervous symptoms are then manifested." By the passage of the organisms along the intestine without doing injury, the sheep are believed to be rendered immune, "so that when the period of danger arrives, they fail to take the disease." Sheep not thus "prepared have little power of resisting the passage of the organism into the peritoneal cavity, and consequently many fall victims to the disease," a fact which accounts for the large death-rate among lambs and hoggs, and the excessive mortality among sheep brought in spring from clean to foul ground. This is not an infectious disease, and few, if any, sheep take it a second time.

Preventive Measures.—Subcutaneous inoculation of their bacilli in this group of diseases (specially in the case of anthrax and loupin' ill) "was found to be uncertain and unsatisfactory . . . sometimes ending in the death of the animal." "The results of 'drenching' or introducing the organisms by the mouth, proved eminently satisfactory," except at those times of the year "when the animals are in a susceptible condition," as "the disease may then be communicated and death ensue." "The drench was prepared by incubating the specific bacteria on glucose-beef-tea and mixing with a little water, a second dose being given a week to a fortnight later."

Certain other means of prevention have already proved useful in practice, viz., cutting or burning, at the proper season, all excess of rough herbage, and the pasturing of cattle along with sheep, especially during early summer.

Affected animals, not actually prostrate, should be kept in a perfectly quiet place, and, to prevent excitement, neither man nor dog should be allowed to approach within sight. When down, fat sheep should be killed at once: others in store condition may first be bled, if there be brain affection, then well fed, turned repeatedly from one side to the other, and moved regularly to fresh ground. A small percentage recover after becoming unable to walk.

"**Scrapie**" is a disease, found principally in the Scottish Border Area, which has assumed an alarming importance within recent years. It affects mainly the native breeds—Cheviot, Border Leicester, and Half-bred—and occurs in sheep of both sexes generally between the ages of two and three years. Younger and older sheep are more rarely affected. The symptoms are a gradual and ultimately extreme emaciation combined with an intense itching and great muscular weakness, which last gives a characteristic jerky "trotting" gait. The first symptom is constant; the others are less so, but one or the other is generally marked, so that some distinguish between "rubbing" and "trotting" varieties of the disease. In the first type the wool is torn off in patches by the constant rubbing against walls, etc., or is pulled out by the teeth. Affected animals never recover.

Dr J. P. M'Gowan of Edinburgh, who has fully investigated the disease, believes that it is caused by the presence in the muscle tissues of enormous numbers of protozoan parasites (sarcocysts). These dislodge the muscle fibres, and interfere with their action, thus producing the muscular symptoms; and they also produce toxins which cause the intense itching, as has been shown by injecting their extracts into rabbits. The curious fact is that these sarcocysts are present, in greater or smaller numbers, in the great majority of healthy sheep, and it is only when they increase to an enormous extent that the symptoms of scrapie appear. The disease is not contagious (except as between an affected ewe and her lambs, whether her own or "twinned-on") so that an affected stock may be gradually replaced by a healthy one, a measure that has been frequently carried out with success. The common means by which it is spread seems to be the retention, as breeding stock, of the progeny of affected ewes. Such ewes will generally remain apparently healthy until they have bred one or perhaps two crops of lambs, and only later develop the scrapie symptoms; but in such cases it is probable that their lambs will ultimately become affected also. Many farmers believe that rams from affected stocks are an important agent in the spread of the disease, but conclusive evidence of this is lacking. It is quite probable, however, that a constitutional predisposition to scrapie may be hereditary, in which case selection of rams from healthy stocks would be very important.

No cure for the disease is known, nor, on the foregoing hypothesis, can much hope be held out that a cure will be found. Breeders should therefore concentrate on its prevention, by breeding from healthy ewes. Where a "clean" ewe stock cannot be introduced, ewe lambs for breeding should be selected from among the progeny of the oldest ewes, as the latter are much less likely than young females to transmit the disease. In other words, heavily infected ewes such as are most likely to hand on the infection, will generally have died off before they reach the middle of their breeding life. The system commonly followed, whereby only the progeny of the younger ewes are retained for breeding (the older ages being crossed to produce feeding sheep), seems to be partly responsible for the spread of the disease.

Double-scope or **Death-scope** is supposed to be a pining disease, a remedy for which was discovered by a Yorkshire shepherd about the middle of the nineteenth century. It is said to affect sheep "on hard, poor, rough land, where there is too much rough old grass, or on cold wet farms in high districts" in the North of England (especially Yorkshire) and in Scotland—the animals most commonly affected being hoggs or sheep under two years old. Attention is drawn to them by their thin and unthrifty condition and want of growth; and on examination the frontal bone proves weak or soft, and easily broken in by a blow with the knuckles, which is the remedy believed in by experienced Yorkshire shepherds, and by not a few observant sheep farmers who practise it on many thousands of sheep every autumn, in October or early November. The supposed remedy is little known, and not much believed in, in Scotland, but John A. Willis expresses the common belief of Yorkshire farmers when he says: "Sheep usually recover if the skulls are broken in before the animals get very weak. I have (March 1905), five half-bred hoggs doing very well, feeding for the butcher, that were so weakened by the disease as to be unable to travel to the railway station in October."

George Metcalfe, M.R.C.V.S., Settle, diagnoses the disease as "a form of anæmia which appears if sheep remain too long on pastures deficient in some constituent, probably phosphates. . . . If changed on to freestone land, they will generally improve and do well." As a preventive, farmers usually move their sheep every week or two. Preliminary inquiries made by the Veterinary Department of the Board of Agriculture in the end of 1906, failed to find any scientific or other reason for cracking the frontal bones of affected sheep. If the operation be only a preliminary to a change to better pasture for thin sheep usually brought in from the moors, the credit is more probably wrongly allocated to a mistaken practice in place of to the change of food. The disease seems to be similar to **Vanquish**, which occurs on poor soils resting on granite, and which is checked by good shepherding, and cured by a change to better pasture on another geological formation. Both diseases require to be further investigated. See "Vanquish," by J. P. M'Gowan and W. G. Smith in *Scottish Journal of Agriculture*, July 1922.

Temporary Blindness is most frequently met with after a long spell of cold wet weather. A dim, opaque scum forms over the pupil of the eye. This would disappear naturally in time, but, as the animal cannot see to feed, it falls off in condition, and may fall into a hole. Bleeding at the eyes is the shepherds' remedy. A penknife is inserted between the frontal bone and the skin immediately above the inner corner of the eye, and a large vein, which bleeds profusely, is severed. The contagious form, *epizootic conjunctivitis* and *keratitis*, spreads rapidly through a flock in close contact, and the animals fall off in condition. The *treatment* is to keep the sheep as quiet as possible for the ten days in which the ailment runs its course, and bathe the eyes with a solution of boracic acid (2 drams to a pint of tepid water).

The **Bacillus of Necrosis** causes necrosis of the skin of the face and lips and diphtheritic processes in the mouth, pharynx, and intestines, and sometimes multiple necrotic areas in the liver. An interesting observation was made in 1913 of the occurrence of the *B. necrosis* in nodular or "spotted" liver in lambs a few days old by Professor Cave of the South-Eastern Agricultural College, Wye. A large number of fatalities occurred among the lambs, and it was evident from the lesions that the liver must have been affected while still *in utero*. Many of the lambs were still-born. Infection had probably come from the uterine blood (see Chapter XIII.).

Foot-rot is also in all likelihood at times caused by the bacillus of necrosis. It was noticed that dipping with arsenic reduced the lameness of sheep suffering from foot-rot, and from this sprang the custom, for prevention as well as for cure in mild cases, of driving sheep once a fortnight through a trough containing a solution of arsenic. The drying and hardening action on the horn is injurious if repeated oftener. In very bad cases, all horn that has separated from the inner structure of the foot by inflammation followed by suppuration must be removed with a sharp knife (Fig. 101), and the raw exposed surfaces, which would grow proud-flesh if not attended to, dressed with a caustic or acid mixture, as arsenic is hurtful to a large open sore. A flock of sheep may be badly injured in condition, and made to appear as if they were foundered, if driven through a strong solution of arsenic when their feet are in a raw state; and serious consequences result if pellets of undissolved arsenic are left adhering to the hoofs.

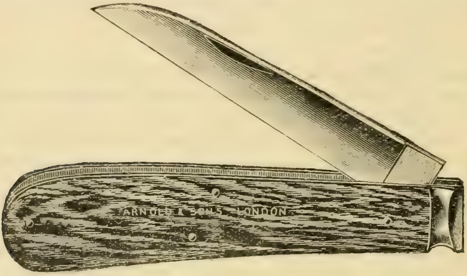

Fig. 101.—Sheep Foot Knife—Spring-back.

"The natural home of the sheep is on dry and stony uplands where herbage is sparse, and long distances have to be covered to obtain their living; this exercise and sparseness of food keep the sheep in lean yet hardy condition, the hoof grows slowly and is consequently harder, and the wear and tear on sole and wall of the hoof are in due proportion; but, when sheep graze on the lowlands and on soft pastures where the herbage is luxuriant, the opposite conditions rule; the sheep become fat and heavy for their feet, the horn is soft, the wall grows more quickly, and the soft ground does not wear it down. The wall of the hoof turns in on the sole, sets up irritation and consequent inflammation, dirt lodges between the folds and crevices of the ragged horn and stops up its natural tubes; degeneration of the horn and foot-rot results. This inflammation may extend to all the sensitive structures of the foot, and even to the bone.

"That ewes in lamb so often suffer, may be put down to the fact that they are heavier by reason of pregnancy, and that they are also on the best and richest pastures, and therefore wear the feet little. Since sheep are all on the pasture and subject to the same conditions, foot-rot would arise from the same cause in many sheep at the same time; hence sprang the belief by some that foot-rot was contagious. There is, however, a **contagious form** of foot-rot,[1] not so common in this country as on the Continent: in it the horn is not first affected, but a discharge of a yellow sticky fluid of an ammoniacal odour runs from the interdigital glands, acts on the horn of the hoof, and produces an irritating effect similar to that of true foot-rot."

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[1] See Professor Geo. T. Brown (Kt. 1898), *R. A. C. Journal for* 1892.

Treatment.—Sheep's feet should be examined regularly at short intervals, and all superfluous horn pared away; the wall of the hoof being reduced to the level of the sole. When the disease is contracted, all the diseased and loose and under-run horn should be removed, the feet pared to their proper shape, and the affected parts smeared with such dressings as the butter of antimony. Carbolic acid and tar in the proportion of 1 to 20, acts as an antiseptic and keeps the foot clean. Other dressings are, copper sulphate and Stockholm tar, one part of the former to two of the latter; and various caustic pastes or "Shepherds' Friends."

When large numbers have to be treated, only the worst cases can be hand-dressed before going through the foot-bath. The trough should be 12 ft. long, 1 ft. deep, 8 in. wide at the bottom, and 14 in. at the top, but the ends only 3 in. high. The sheep then easily step into it when it is placed level on the surface of the ground, between two rows of hurdles or paling just far enough apart for them to pass through. The solution (strength, one pound of arsenic, dissolved by prolonged boiling with a little carbonate of soda to 5 gallons of water) is put into the trough, till it is from 1 to 1½ in. deep, so that it cannot rise above the horny part of the foot, else it might blister the skin and cause the hair to fall off. The sheep are driven quietly through, to prevent splashing of the liquid against the uncovered skin. Crude carbolic acid (strength, 3 or 4 parts to 100 of water) or pitch-oil, dissolved by boiling with black soap, and mixed with eight or ten times its volume of water, is sometimes used instead, or alternately with arsenic if the sheep's feet become too hard. The box should have a tight-fitting lid made to close when not in use, in order to prevent the poisoning of stray animals by drinking from it.

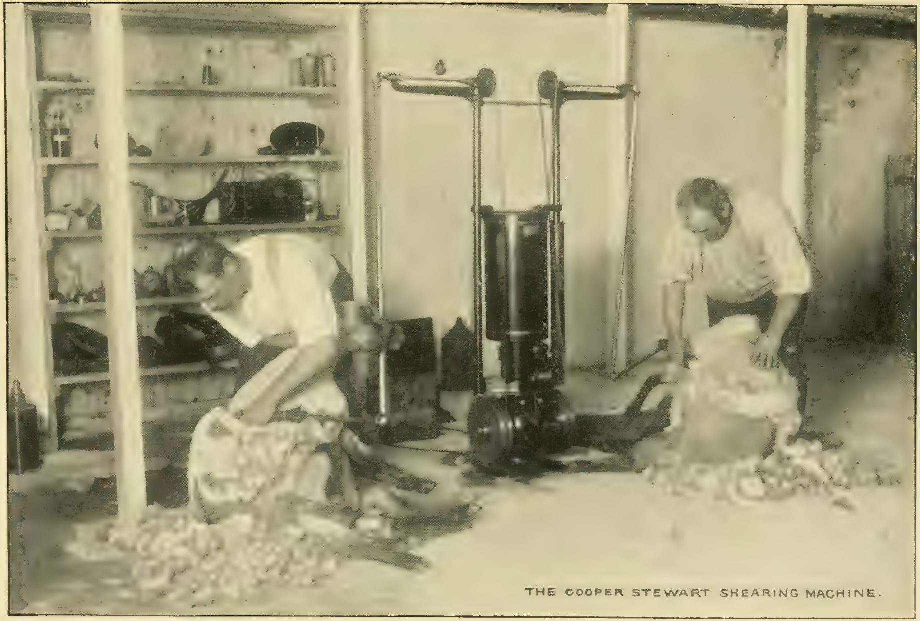
To help to maintain the feet in a normal condition, lime in the powdery caustic state is sometimes laid down at gateways or places over which the sheep walk. A common cause of foot-rot is dung or some foreign matter getting at the tender structures of the internal foot, on account of some softening, decay, or weakness of the outer horny box, and then suppuration and fungoid growth follow. Inflammation, which develops into foot-rot, not infrequently begins as a scald between the digits, resulting from the irritation produced by long soft grass in wet seasons. The feet of sheep that have been affected with foot-rot are more susceptible of the disease in future; thus foot-rot is difficult to get rid of when once well established.

Blotches,[1] causing lameness, originate in wart-like growths, which, in the first stages, are hard and scaly externally, and gorged with blood within. They appear in some seasons about the coronet and lower parts of the legs. The affection is not contagious, although it breaks out in a flock suddenly, and at times attacks the greater number of the members more or less seriously. Clover is thought to produce it, by mechanically irritating the skin of the legs frequently when sheep are on pasture in autumn, and it usually disappears when the flock is put on roots. Sheep fall off much in condition, and in some of the more aggravated cases die of blood-poisoning, pus having found its way into the blood by absorption of the fetid discharge which comes from the sores in the later stages of their development. The remedies are, to remove the sheep from the conditions under which the malady broke out, and to dress the affected parts without delay with the hot iron, or with carbolic, caustic, or acid applications.

Dew-rot is an occasional cause of lameness which appears in April, and even to a greater extent in autumn, in damp, foggy weather, or when there are sudden changes of temperature at night, resulting in frosts or heavy dews. It appears at first in the form of white blisters, between the digits, or on the anterior surface of the coronet. The hair falls off the affected parts, which are left bare, and in a short time become open sores. If they are not at once treated by using a stimulating embrocation, after opening them with a knife, the inflammation and irritation spread until the whole foot-structure is involved, and the ultimate condition becomes something like an aggravated form of foot-rot, the horny parts sloughing off. When it takes this serious form, the proper treatment is to poultice with tar, bran, or linseed cake (ground and "burst" with hot water), to reduce inflammation, allay pain, and keep dirt from the wounds. Sheep thus affected fall very much off in condition, but there is no fear of death if proper precautions be taken.

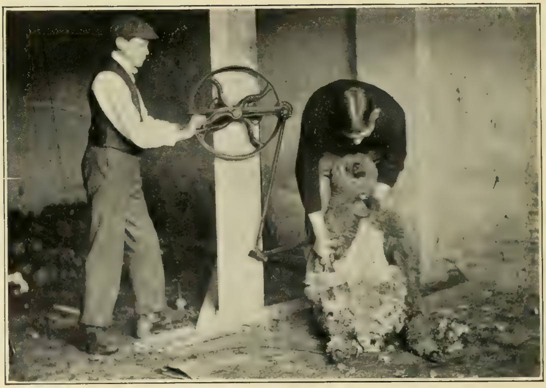
The disease is reported to have appeared in Gloucestershire, for the first time, about 1870. Some places are more subject to it than others. The pastures are frequently worst which have not a good aspect, such as those lying away from the sun. Immediate and constant attention is positively necessary, to prevent the development of the mature form of the disease; and the whole flock must be removed, and put on arable land which is not under pasture. Dew-rot very frequently appears among ewes that are going with the ram, and are consequently better fed at this time than usual. A

[1] Termed "oafe" or "orf" in Scotland.



The Cooper-Stewart Shearing-Machine.

[*Wm. Cooper & Nephews.*

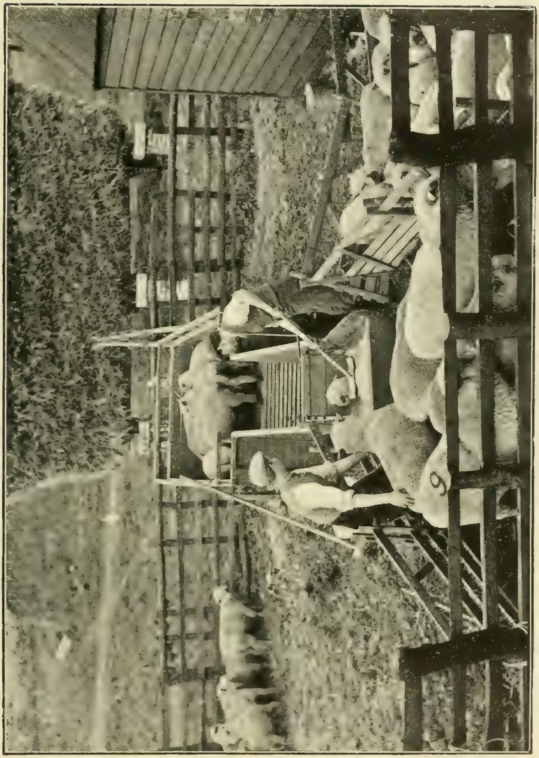


A. Champion Hand Power Shearer.

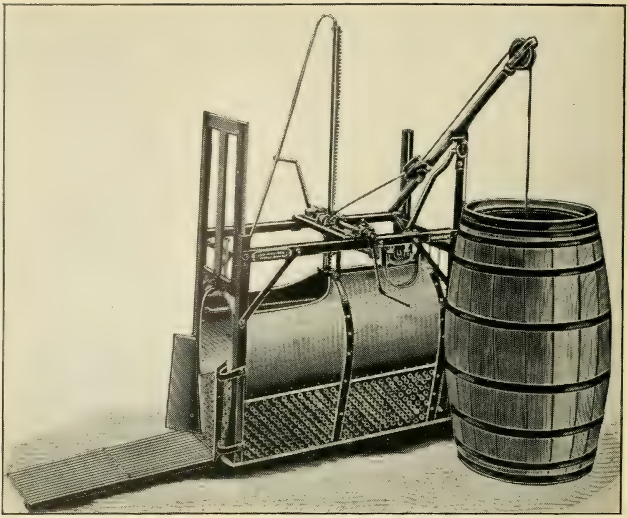
[*Wm. Cooper & Nephews.*

B. Shed for Feeding Sheep, Millcraig, Alness.

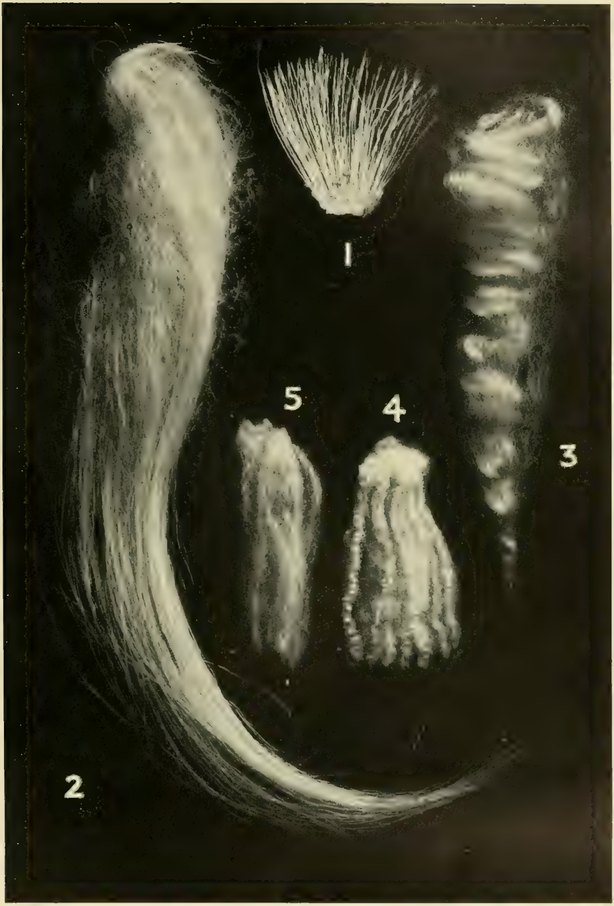
PLATE CCXI.



Cooper's Portable Swim Bath in Use.



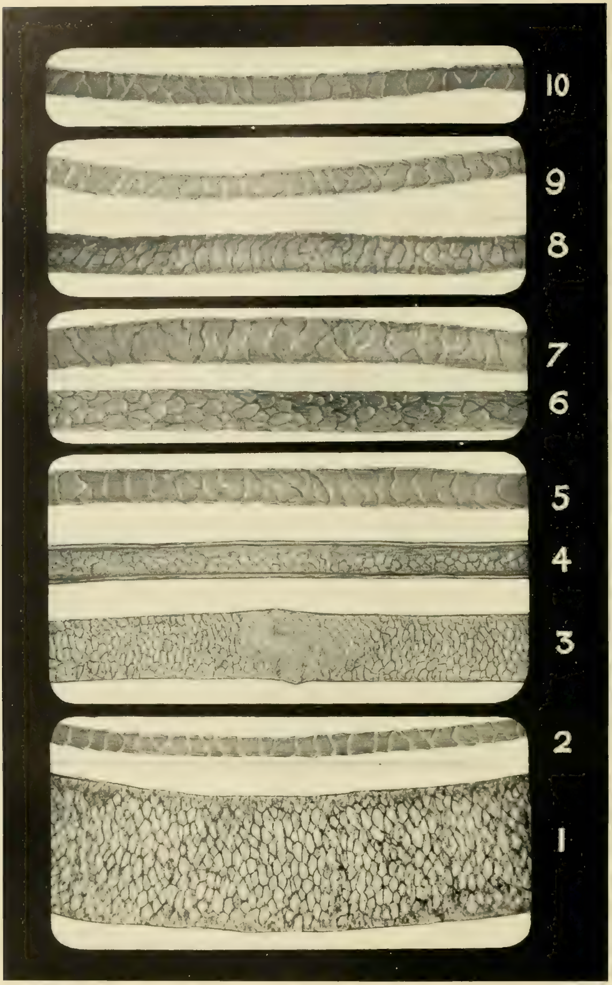
SHEEP DIPPER.
Patented by J. and R. Wallace, Agricultural Engineers, Castle Douglas.



1. Sample of Fleece of Marco Polo's Sheep, showing hair and shorter curled wool. Half natural size.
2. Sample of Fleece of a Blackface Sheep. Half natural size.
3. Sample of Fleece of a Leicester Sheep. Half natural size.
4. Sample of Fleece of a Southdown Sheep. Half natural size.
5. Sample of Fleece of a Merino Sheep (1810). Half natural size. This wool in perfect preservation, with the "yolk" clearly visible when 112 years old. Supplied by George Drewitt, Bridge Street, Guildford.

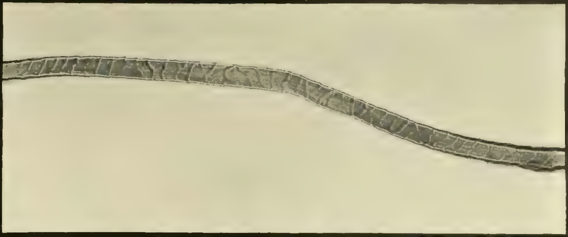
Prepared by Miss J. S. S. Blyth, B.Sc., and photographed by J. M. A. Chisholm, of the Animal Breeding Research Department (Dr F. A. E. Crew, M.D., D.Sc., Director).

PLATE CCXIV.



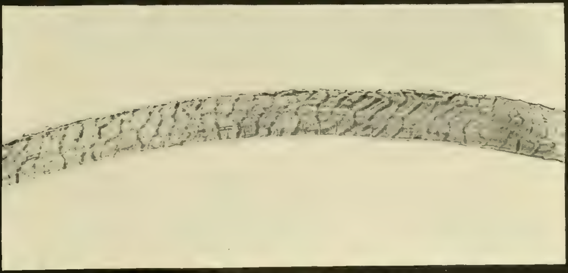
1.	Marco Polo's Sheep.	Hair.	× 65
2.	Do.	Wool.	× 260.
3.	Blackface Sheep.	Kemp.	× 65.
4.	Do.	Hair.	× 65.
5.	Do.	Wool.	× 260.
6.	Leicester Sheep	Thick fibre.	× 130.
7.	Do.	Wool.	× 260.
8.	Southdown Sheep.	Thick fibre.	× 130.
9.	Do.	Wool.	× 260.
10.	Merino Sheep (1810).	Wool.	× 260.

Microscopic slides prepared by Miss J. S. S. Blyth, B.Sc., and photographed by J. M. A. Chisholm, of the Animal Breeding Research Department (Dr F. A. E. Crew, M.D., D.Sc., Director).



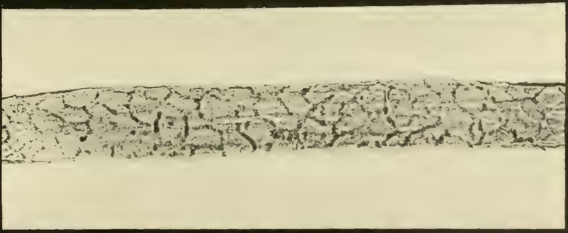
2

PURE AUSTRALIAN MERINO.



69

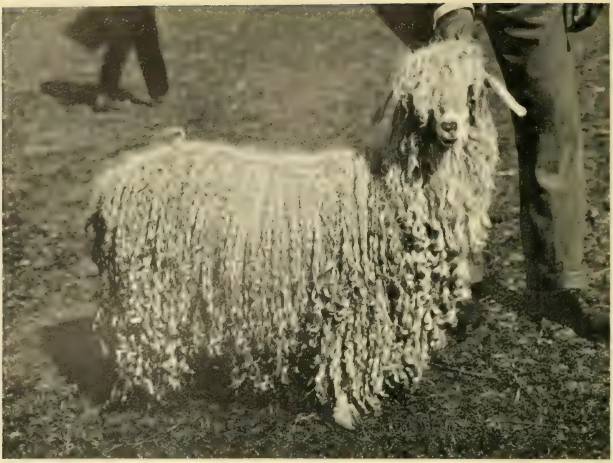
LINCOLN-MERINO CROSSBRED.



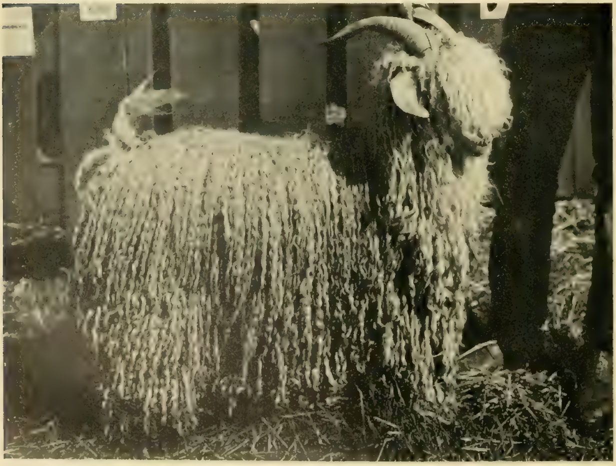
22

PURE LINCOLN WOOL.

[Block lent by the Highland Society.



A. Angora Ewe, aged 19 months, growth of hair 12 months; staple 13″.
Winner of many prizes in 1912.
Bred by W. Guard Hobson, Crochdale, Mount Stewart Station, Cape Province.



B. Angora Goat Ram.
First, group class, Cradock, 1912; First, registered 2-tooth class, Port Elizabeth, 1912.
Bred by Cawood Bros., Mount Stewart, South Africa.

rapidly improving condition may render the system more susceptible to the disorder, as is the case with many other diseases. Sheep that are being forced under high farming methods or for show purposes, are more liable to give trouble than those fed in a moderate way; and the death-rate, as a rule, is then much higher.

Another common cause of an excessive death-rate is allowing sheep, through bad management or want of proper food, to fall into an unthriving condition, or, in common language, to get a "backset." If hoggets are kept, more particularly late into spring, on a turnip crop which has not been properly cleaned of weeds while growing, a very alarming death-rate frequently occurs. There is a pretty widespread belief in Gloucestershire, both amongst farmers and shepherds, that chick-weed, *Stellaria media*, if abundant, is most hurtful to young sheep.

Mercury poisoning takes two forms—the acute and the chronic—the former resulting from an overdose of calomel, or of corrosive sublimate, the latter from prolonged administration of mercury as a drug. Corrosive sublimate is a colourless powder used as a disinfectant, and sometimes given by mistake. The *symptoms* are great salivation, colicky pains, fetid breath followed by loosening of the teeth, partial paralysis, bloody diarrhœa, and death. In both cases the treatment is to administer large doses of white of egg.

In the case of sheep, mercurial poisoning was more common when salves or smears containing mercury were used. The practice then was to remove the wool and wash with an alkaline solution, and treat as for ordinary mercurial poisoning.

Copper poisoning occurs among sheep pasturing near smelting furnaces. They suffer from swelling of the joints, emaciation, and trembling fits. *Treatment.*—Remove to clean pastures, and give good food and tonics.

CHAPTER XXXVI

WOOL

Structure of the Wool Fibre—The Woollen and Worsted Industries—Valuable Qualities and Defects—Marketing.

SHEEP wool is the most generally useful of all animal hair fibres, although several others, such as mohair and cashmere (from the Angora and Cashmere goat respectively), camels' hair, alpaca, vicuña, and even horse and cow hair, have considerable commercial value. Wool is the chief component of all fabrics in which warmth is desirable, and hence it is very largely used for clothing purposes in all the colder regions of the globe. It is also employed in the manufacture of blankets, carpets, upholstery cloths, etc.

The wool fibre is normally round in cross section and fairly uniform in thickness throughout its length. It consists of a mass of dead cells, which are often round or oval in the central or medullary portion of the fibre but are always flattened and scale-like towards its outside. The outer scales overlap somewhat, so that the surface is very slightly serrated, the teeth all pointing away from the skin. In its natural state wool is covered with secretions from the oil and sweat glands of the skin; this "yolk" grease or "suint," which is removed by scouring, may constitute from 10 or 20 up to 50 or 60 per cent. of the weight of the natural wool. Merinos have generally a very high proportion of grease, and the amount is greatest where sheep have been living under dry climatic conditions. The diameter of the individual fibres varies from about $\frac{1}{2000}$ to $\frac{1}{500}$ of an inch, although occasional coarse hairs exceed the latter measurement. The natural colour of the wool is of course generally white, but may be black, grey, or brown.

The raw material is treated according to either of two processes, the two industries being known as the **woollen** and **worsted** respectively. Although many commercial wools can be treated by either process, the requirements of the two industries are in some respects divergent. In the woollen trade what are termed **clothing wools** are employed. After the initial process of scouring, which should be so conducted as to remove the yolk without damaging the fibre, the material is **carded**. This process is carried out on a machine consisting of a series of rollers covered with short wire teeth. The wool, pulled apart into a thin film by the teeth of the card, is transferred from one roller to another and emerges from the machine in the form of a very delicate web, 2 or 3 ft. in width, in which the individual fibres run in all directions. This web is condensed, drawn, and twisted into a thread in which again the fibres are without definite arrangement. The thread itself has comparatively little strength, but when it is woven into a fabric and treated with water, heat, and pressure, the threads felt together and a moderately strong, fine cloth, showing little thread structure, is obtained. In clothing wools length of fibre is of little importance—the woollen manufacturer has a saying that he can spin anything that is long enough to have two ends. Strength is likewise not essential. The important qualities are fineness, softness, and springiness in handle, and felting power. The last depends in part on the serrations of the surface of the fibre, which should be strongly marked and numerous, and on the "crimp" or waviness of the fibre. Fine clothing wools have a regular and close crimp with up to 20 or 30 curls per inch.

In the worsted process the scoured wool goes through a preliminary treatment, *carding* in the case of the shorter wools and *preparing* in that of the longer and stronger types. The preparing machine consists of a set of feed rollers moving at a given speed, and of a series of combs which travel away from the rollers at a faster rate than the wool is fed. The effect is to produce a fairly uniform rope of wool in which the fibres lie straight and parallel; the process is repeated several times over, two or three ropes being combined and reduced at each stage. The prepared or carded wool is next **combed** in order to remove the short fibres or "**noil**," and the remaining product or "**top**" is washed, drawn, and twisted into yarn. Worsted yarn is thus composed of long straight fibres arranged parallel to each other, and is therefore strong and elastic. Worsted cloth has a bright and lustrous appearance and a somewhat marked thread structure. It will be obvious that the requirements in the case of worsted wools differ in some respects from those of the clothing class. **Fineness** is of course desirable, and is of much importance as a price factor, but the essential qualities are **length of staple** and **uniformity in the length** of the different fibres; **strength** of fibre, and therefore freedom from breaks or weak parts in the staple, such as are produced when sheep are temporarily out of thriving condition; and, finally, **lustre**, which is correlated with a smooth surface and the absence of marked scale structure. The stronger wools, such as Leicester, Wensleydale, and Lincoln, are those in which lustre is most marked, whereas the finer types, such as Merino combing and Down wools, are lacking in this quality.

Apart from the special requirements of the two manufacturing industries, there are certain questions of general importance that demand the attention of the wool grower. Whatever the type of wool aimed at, it is important that the different animals in the flock should conform to it. One of the great advantages that Australia has gained in the wool market is that she is able to market large parcels in which the type of fleece is very uniform. Again, it is well known that the wool in different portions of the fleece varies in length, uniformity, and fineness and that these various qualities have to be separated by the wool sorter. The shoulder wool, for example, is fine and uniform and deep in the staple, whereas the britch wool tends to be irregularly grown, coarse, and mixed with strong hairs. Great progress has been made in the Merino breed towards obtaining uniformity in the fleece, with the result that little sorting of such wools is now necessary, and there appears to be no reason to suppose that the same result could not be obtained in other breeds.

Much of our British wool loses greatly in market value on account of the presence in it of **black fibres** and of **kemp** or strong brittle hairs. The first defect is most prevalent in the dark-faced breeds, and in these it is doubtless difficult to eliminate; but wool-growers should realise that fleeces with even a few dark hairs cannot be used for the manufacture of light-coloured fabrics, and hence are often seriously reduced in value. Kemps are likewise very objectionable from the manufacturer's point of view; they can undoubtedly be bred out if care is used in selection of breeding stock, and such care would be very profitably repaid.

Farmers have in the past regarded wool as an unimportant by-product of the sheep industry; but even if this view be admitted, it seems certain that closer regard to wool characters in the ordinary routine of culling breeding stock would produce a very material advantage. The main points should be a length and density of staple ensuring weight of fleece, fineness, and freedom from black fibres and kemp.

The condition of the wool when marketed is another matter that largely affects its price. It is now fortunately rare to get parcels of wool that are full of straw and "cots," tied up with binder twine and packed in jute sacks, yet there is still room for much improvement. Every care should be taken to prevent the admixture of vegetable matter, whether burrs, grass seeds, straw, or strands of jute, etc., from packing materials. It is not of particular consequence whether wool is sold washed or unwashed, but in the former case it should be clean; and cleanness can only be secured when the sheep are thoroughly washed in pure water and are clipped within a few days. Cots should be removed and thrown aside before clipping is commenced, and the work should be done on a clean wooden floor which is frequently swept. The wool should be rolled up and tied either with a rope twisted from the neck portion of the fleece or with special woollen rope. Woollen packs to contain the fleeces are supplied by most merchants. Ordinary jute sacking must never be employed.

Co-operative wool-marketing societies have been established in various districts under the Agricultural Organisation Societies, and are of very considerable benefit to their members. The fleeces from various small flocks are classed according to quality and type, and thus considerable quantities of definite grades can be placed on the market. The average price obtained is then considerably better than if the various small and mixed clips had been sold individually.

Slump in Wool Prices.—"The great slump in wool prices is illustrated in a most striking manner in the reports of the Salisbury Wool Fair, July 1921. A year ago at this fair washed Down wool sold up to 5s. 3d. per lb., and unwashed up to 4s. 5d. In 1914 the top price for washed Down wool was 1s. 3¼d., and this figure was also the top price at last week's fair. In 1914, also, unwashed Down wool sold at from 9½d. to 11d. per lb., and this again was the range at this year's fair. Thus the whole of the rise during six years of war and armistice conditions has been wiped out in one year of peace. Owing to the reduction in the number of sheep, the wool clip of the United Kingdom last year was but 100,000,000 lb., as against 108,000,000 lb. in 1919, and 125,000,000 lb. before the war."

In the following list of prices, 1922 quotations are given, together with those for the same period of the previous year, and the corresponding date in 1914. The quotations are for good, well-classed, and well-washed fleeces, on Bradford terms ; allowance must be made for carriage and handling charges.

	31st May 1922. Per lb.	2nd June 1921. Per lb.	4th June 1914. Per lb.
	d.	*d.*	*d.*
Southdown tegs and ewes . .	18½	18	15½
Pick Shrop. hoggs and wethers .	15½	16	15
Oxford Down tegs and ewes . .	14½	13½	14½
Best Kent tegs	12½	12	14¼
Irish hoggs, super	10½	11	13
Cheviot hoggs, super . . .	13	12	14
Lincoln hoggs	10½	9	12¼
Leicester hoggs	10½	9	12½
Welsh fleeces, selected . . .	8½	9	12¾
Blackface ewes and wethers . .	8	5½	8¾

CHAPTER XXXVII

GOATS AND GOAT-KEEPING[1]

Historical Introduction—Suitable Pure Breeds and their Crosses—Show Points—Disbudded Goats—The Angora Goat Described—Unsuited to our Climate—Breeding and Management of Goats—Housing—Pasturing—"Soiling"—Rearing Kids—Milking—Yields and Quality of Milk—Famous Milking Goats—Free from Tuberculosis—Uses of Goat's Milk—Exhibiting—Diseases and Treatment.

GOAT-KEEPING in England was for a long time restricted almost entirely to cottagers, and especially to those residing in the neighbourhood of commons where these animals can manage to get their own living by grazing in summer, and browsing on gorse and bramble bushes in winter. In the early 'seventies action was taken by people in a higher class of life to improve the milking capabilities of this kind of stock by careful selection and mating with good specimens from abroad, mostly from India, brought over on the P. & O. boats for supplying milk to children. It was about this period that the present writer brought out the first book published in England on the subject, an event which led to the introduction of goat shows. The first of any importance of these competitions was held in 1875 at the Crystal Palace, and the second in 1876 as one of the inaugural features of the London Dairy Show. Since that date goats have taken a prominent place at these Islington gatherings. It was only, however, after the establishment of the **British Goat Society** in 1879 combined with the personal influence of its Patroness, Baroness Burdett-Coutts, that the movement began to make headway in public favour. Many owners of large estates gave encouragement to their cottagers to supply their families with milk by themselves starting a herd and furnishing their tenants with milking goats at low prices, generally on the instalment system. Medical men came forward, after discovering the curative as well as nutritive properties of goats' milk for children and invalids, and recommended the keeping of milk goats by all country folks who had facilities for so doing.

As the utility of this animal became known, the demand for it soon exceeded the supply, but it was not until about the middle of the Great War that the country generally realised the value of the goat as a potential asset in the nation's milk supply. This occurred when the scarcity of cows' milk, which for some time had been apprehended, began about 1916 to be seriously felt, and after some alarm had been created on account of a possible milk famine. Then the rush for goats followed, and people were buying up everything in this way that they could lay hands on, dealers making a big harvest in consequence. Goats that before the war could be easily bought for £4 or £5 were soon fetching £14 and £15, whilst £40 and £50 were no uncommon figures for superior specimens.

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[1] By H. S. Holmes-Pegler, late Hon. Sec. British Goat Society, Coombe Bury House, Kingston Hill. (See Appendix A, "Live Stock Societies —Goats.")

Selecting a Breed.—One of the first questions that the beginner in goat-keeping asks is as to the selection of a breed. At the same time skilled advice is not easy to give that can be followed, because the choice is so restricted, and such stock as one would wish to recommend is so hard to procure. To enumerate the recognised breeds is one thing and to tell the reader where to get them is quite another.

The domesticated goats of the country consist generally of the English and the Irish, and various crosses of these with other and superior breeds, viz., the Anglo-Nubian, the Toggenburg, the Saanen, the "Swiss" or Anglo-Swiss, and the British Alpine; which last has only recently received official recognition as a breed. There are also the Maltese, the Pyrenean ; and other Continental varieties of milch goats, including the Egyptian Zaraibi, and the Angora bred in large numbers abroad for its fleece, commercially known as mohair. Such breeds are never seen in England now, no importation has taken place since 1903. (See Appendix V, "Wild Goats.")

Success in goat-keeping very often depends not so much on the breed as on the strain. During the last forty years quite a number of people have made a speciality of milk production, relying on no particular breed but making selections of the best milkers generally, and crossing these again with some other variety in which the same quality has been established. Such goats are therefore difficult to distinguish by breed, combining as they do such diverse blood.

Amongst those which are recognised as pure breeds are the following :—

The Anglo-Nubian.—This is a favourite with many people on account of its aristocratic appearance, its close sleek coat and long drooping ears. It has a peculiarly shaped head, the facial line being arched, and the muzzle narrow with the under jaw frequently protruding beyond the upper. Its milk is generally rich, but rarely if ever equal in quantity to that of some of the Swiss varieties. The Anglo-Nubian was originally the result of crosses between the common short-haired English goat and the Indian breed, a few being interbred later with imported specimens of the Nubian—these two Eastern varieties being closely alike in appearance. "The Nubian, or 'Zaraibi,' as it is known in Egypt, was once a very famous breed, but very hard to procure, as the Arabs observe the strictest precautions against exportation. The head, which is characteristic, with very short face and broad poll, should be hornless, though horns are occasionally met with. It has a pronounced Roman nose and an 'under-shot' jaw, which gives it a camel-like appearance, and may even render it difficult for a really good specimen to graze. The ears are long and drooping, and, it is said, they should be long enough, when pulled round, to cover the mouth and reach to the eye on the other side of the face. Two tassels fully an inch long and somewhat flattened are occasionally present under the throat. The hair should be short in the female, but slightly longer in the male, which has sometimes a small beard. The colour should be reddish-brown, brindle, or brindle and white. The breed is very prepotent, giving rise to the characteristic shape of the head in its crosses, which now comprise the best milking goats to be found in Egypt." Towards the close of the last century a pair of pure Nubian she-goats were sent from Egypt by the Duke of Connaught as a present to Queen Victoria, who kept them for a time at Windsor. These, on the death of the Queen, were sent to the Zoological Gardens, and later entrusted to the British Goat Society to be bred from, though the breeding experiment proved unsuccessful. Plate CCXIX. A depicts one of these goats; she died giving birth to twins.

Plate CCXXII. B is a typical specimen of an Anglo-Nubian male. It is a famous animal in America, and was a frequent prize-winner and renowned stock-getter, from which a large proportion of the Anglo-Nubians of to-day are descended.

The Toggenburg is a breed in great demand because it comes from a part of Switzerland where goats have been bred for centuries for milk production, but this breed is scarce in England and those who fail to obtain it should secure instead what are called "Swiss," which means a combination of three Swiss breeds—Toggenburg, Saanen, and Alpine, but free from any other blood. When these are crossed with English goats they are called Anglo-Swiss, and if to these Anglo-Nubian blood is added the progeny are described as Anglo-Nubian-Swiss. A large proportion of the chief milking prize winners come under this description though in such cases the Eastern features are not very noticeable, the Nubian element being remote.

The Toggenburg is quite distinct as a breed. It should be, and generally is, hornless. The colour is light brown approaching more to a drab, with well-defined white markings but showing no other colour. These markings consist of a white stripe down each side of the face, a patch on the rump at each side of the tail; white legs, as far as the knees and hocks, and usually white under the belly. The coat should be short, but long-haired specimens are sometimes met with here, though far more often in Switzerland.

The **British Toggenburg** is a variety which has been lately established. It consists of animals which possess all the markings and points of the pure breed but which are not sufficiently pure by blood to be accepted in the Toggenburg section of the *Herd Book*.

As common goats are frequently sold to the uninitiated as Toggenburgs, it behoves the novice to keep well before him the above description in order that he may not be deceived. A pure Toggenburg has always a *Herd Book* number prefixed with the letter T, and no goat so described should be accepted as genuine without this guarantee.

The British Alpine is the same type of animal as that just described, with the same white markings, but with the body colour black.

The "**Swiss**" goats, technically so-called, have again the same type, but the colour varies—from the Toggenburg drab or chocolate to the black of the Alpine, or to any shade of brown.

The **Saanen** is a breed largely met with in the Simmenthal (Valley) of Switzerland, but rarely in a pure state in this country. It has much the same type as the Toggenburg but is pure white or at least cream coloured.

The Ministry of Agriculture authorised an importation from Switzerland (July 1922): it arrived in England on 13th September 1922, and was subject to quarantine regulations until 24th November. It consisted of 29 Saanens and 17 Toggenburgs.

Show Points.—The points are very much the same in all breeds, being based generally on milk production rather than on type; and here shape of body, together with the size and quality of udder, and size, shape, and configuration of teats, are the most important features. In the she-goat the frame should be wedge-shaped from whatever point of view it be regarded, being narrow at the fore and wide and deep at the hind quarters. The head should be light, with a slender neck, and the ribs should be well rounded. A good length of frame is also a consideration. The udder should not only be large and wide but thin-skinned and elastic to touch, a quality which, however, can only be properly discovered after milking, when the bag should shrink to comparatively small dimensions. Great stress is laid on the teats, which should be set far apart, and be of a size to be conveniently grasped by the hand but tapering gradually towards the extremities rather than bag-shaped. An important feature indicative of present or future milk production, observable (prospectively) even at the kid stage, consists in a marked upward slope from the "saddle" to the hip-bones, which are thus set high up and should be wide apart. Thence a sharp descent follows to the tail, which is correspondingly low down. Under this appendage the conformation takes a decided inward curve towards the hocks. This point is remarkably well illustrated in the white male in Plate CCXIX. B. The male goat, as a general rule, should be much larger than the female. His hair is longer and coarser and he usually carries a good-sized beard. In shape he should be massive, with a strong neck, a well-developed chest, and a long level back. On his hind quarters, as also in front, the hair is usually longer. Hornless specimens are generally preferred, as in the case of the she-goat, but horns are not regarded as a defect.

The **Angora goat** is not suitable for our climate, but, as it ranks with but one rival from Cashmere as the King of goats, and is the source of the mohair of commerce used in the making of lustrous cloth fabrics, it deserves special mention. It is a native of the Province of Angora, Asia Minor, and the finest blood centres on Bei Basar. See Plate CCXVI.

The breed has been successfully established in the dry climates of South Africa and Western America. Among goats it is a delicate animal, liable to suffer from pulmonary weakness when exposed to cold and wet, and particularly so if kept on low-lying ground. In none of its new homes has its fleece reached the perfection of the finest Turkish-grown mohair, not being so bright nor having the spinning properties desiderated, although South African "Kidswinter" mohair shorn in summer, is of first quality. Good stud flocks of goats can be got to yield an average of 5 lb. to 6 lb. of hair, and rams more than double that. There is a large and vigorous type which, like certain Merinos, produce more yolk than is normal, and are classified as "oily" as against the common "non-oily" kinds.

In South Africa, where, as early as 1912, there were over 4,000,000 Angoras, they are now divided into three types that are bred separately: (1) The "robust," which produces a heavy fleece; (2) the "medium," also an upstanding type with lighter frame, longer staple, and lighter horns; and (3) the "fine-haired," a smaller and more refined type producing a smaller clip of much finer quality—pure bred representatives of the Turkish ancestors. To suit the climate and preserve the health of the flock, young goats are shorn at six or seven months old and again at twelve or fifteen months, although frequent clipping tends to make the full-grown hair coarser.

Selected white smooth-haired Boer goats, which are very hardy, form excellent foundation stock for breeding-up grade flocks to produce a hardy animal that can rustle for itself and grow a bigger fleece under conditions where the pure Angora would not thrive. The question whether it will pay is the chief thing to consider in all cases where a departure is made from normal practice.[1]

A serious check to the world progress of Angora goat breeding was given by the imposition in South Africa of an export duty of £100 per Angora ram in 1850, followed later by absolute prohibition, which was resented in America and met with high protective duties against mohair; and later, the Sultan of Turkey prohibiting the export of goats in 1880.

Points.—A well-bred Angora should be closely covered on all parts of its symmetrical, rounded, substantial, well-balanced body, with separate locks or ringlets of long, white, wavy, silky, and lustrous hair. The fleece must be free from kemp, an indication of some inferior common cross, and as far as possible, be of fine quality throughout. In addition to the long valuable hair, there is an inferior under coat of finer wool-like hair, like the second coat of a collie, which is removed as "noils" in the process of manufacture. Mohair of good growth may naturally vary in length on the same animal from 9 in. to 6 in. or less. Hanging from the sides, ready for shearing, it should fill the hand when grasped, and feel dense but soft and downy to touch; and as the goat stands, its coat should appear to sweep the ground.

Indications of good breeding are exhibited in a neat, well-proportioned head, a broad forehead, with prominent eyes and a narrow and finely cut nose; the ears broad, thin, flat, and pendent, their outside surface, along with the skin of the face and legs, covered with fine silky white hair; the flattish horns, light in colour, and much larger in the ram than the ewe, becoming twisted and spread outwards with a strong inclination backwards.

Angora goats give more trouble than sheep at lambing time. They are careless of their new-born progeny and many are liable to abortion. In-and-in breeding may have had something to do with both difficulties. They are liable to a contagious lung disease, as deadly as pleuro-pneumonia in cattle, and more rapid in its progress, but it yields to inoculation with the clear lymph which exudes from a diseased lung, and may be prevented by the same means. The scab-mite of the Angora goat, *Symbiotes capræ*, differs from that of the woolly sheep, *Psoroptes ovis*, and that of the short-haired goat, *Sarcoptes capræ*, although the *Symbiotes* (the mite that congregates in families) breeds freely on common short-haired varieties.

It is to be hoped that no attempt will be made to introduce Angora goats into this country (where they could not succeed) even if importation regulations against disease be relaxed under proper safeguards, to admit fresh blood of breeds known to thrive in the United Kingdom. Attempts have been made to introduce Angoras into England. In the late seventies the second Duke of Wellington imported a small herd from South Africa, establishing them at Stratfieldsaye and using the fleece when manufactured into cloth for some garments he wore. The herd was dispersed at his death in 1881.

Disbudded Goats.—Of late years it has become a common practice to arrest the growth of horns from the first symptom of their appearance, by the use of caustic potash. It has decided advantages, but the operation should only be performed by an expert. Some judges at shows are strongly opposed to the "disbudded" exhibit; but the British Goat Society has ruled that a goat so treated cannot be disqualified on that account.

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[1] See "The Angora Goat in South Africa," by E. R. Hobson, in *The Journal of the Department of Agriculture*, November 1921, and Schreiner's *The Angora Goat*, published in 1897.

Breeding and Management.—The natural mating season with goats, as with some species of deer, is generally during the last three months of the year, but may be as late as January or February. The gestation period is five months or a little over twenty-one weeks. A good goat usually has two or even three kids at a birth, though the poorer varieties may have only one. The writer once had a goat which gave birth to six, five, and six kids respectively at three consecutive kiddings, but with such large numbers the kids are weakly. From March to August the she-goat rarely accepts the male, and when she does, the union is far less likely to be fruitful than when mating takes place in the natural rutting season. Very few kids are born in August, and still fewer in September and October. Goat's milk is therefore generally scarce at that period.

The she-goat will breed at a very early age, in fact while still in its kid stage, and the male has been known to reproduce its species even before it has been entirely weaned. Hence it is very necessary to separate the sexes in the autumn when the kids are more than three months old. Opinions differ as to the best age at which to mate the she-goat, a few breeders and especially those who cannot afford to keep their young stock for nearly two years before making any return, let the does run with the buck in the autumn of their first year, but people who exhibit and desire to get size, prefer that mating should take place in the second season, in other words, when the goat is about eighteen months old. Although exceptions are on record, it is a general rule that goats allowed to breed before they are well advanced towards maturity, rarely attain the size they otherwise would, though there is no reason to believe that their future milking capabilities will be affected thereby.

There are not many goats that live longer than ten years, though instances are on record of fourteen years being attained and the animal still giving milk.

Housing.—Goats can be housed at very little cost. When an unused stable or coach-house is not available there is generally a shed of some kind that can be easily adapted for at least a couple of them, provided it is water- and wind-proof and properly ventilated. If several goats are kept—and at least a couple are recommended for the sake of companionship—it is never advisable to have them loose feeding together as the aggressive members prevent their fellows from getting their proper share of food. Little stalls should be erected similar in pattern to those separating horses, and furnished with a manger and hay rack. Most goat-keepers both here and in America use, instead of an ordinary manger, a plain board in which circular holes are cut opposite to each animal, to hold small galvanised iron pails which are let down as far as the rim so that they cannot be turned over. The hay rack should have bars, preferably of iron, not more than 1½ in. apart to prevent hay being wasted. The ground should be of concrete, sloping slightly to the rear, and over this should be placed in each compartment a movable sparred floor raised about 3 or 4 in. for the goats to lie on. Bedding may be used, such as straw, peat moss, or bracken, but the animals often scrape it away with their feet, preferring the bare boards.

The illustration, Plate CCXVII. B, shows the interior of a goat house recently built for the herd of Mrs Browell of Feltham Vicarage, Middlesex. The stalls are clearly shown and special notice should be taken of the sparred floors which, being removable, keep the animals clean, as all excrementitious matter passes through the openings and the liquid is absorbed by finely broken peat moss litter spread underneath.

Pasturing.—It is only in very exceptional circumstances that goats can be pastured like cows or sheep. Their roaming disposition and the habit of barking trees do not admit of their being allowed a free range, so, when out on grass, they require to be tethered. In this process a strong iron tethering pin needs to be used with a light chain—one end of which is fastened to the goat's collar or head stall by a spring hook and the other end to the pin. This is driven into the ground to the depth of about 15 in., a swivel being affixed also at each extremity to prevent the links from kinking. It is important that the swivels and the spring hooks which are very apt to get clogged with dirt, should be working properly.

Tethering, however, can only be practised in fine weather and should seldom be started before March or continued after the end of October. Goats hate rain in any circumstances, but to compel them to endure heavy showers or a constant downpour tethered out in the open without shelter from wind and rain, is sheer cruelty, and is frequently fatal in its results. As in most cases considerable trouble to the attendant is involved by having to go out in the rain to bring in the goat, it is advisable to place a lightly built and easily movable structure, such as a kennel, at the extremity of the chain—even a barrel will answer the purpose for a young or small-sized goat. When this is employed it is a good plan to use a strong galvanised wire some 20 ft. long, fastening it down very securely at the end near the shelter, where it acts as a pivot, with a more easily shifted pin at the other and movable end, stretching the wire as straight as possible. The short chain of the goat is hooked on to this wire, and runs easily along its whole length as the animal moves up and down. This allows a much larger extent of pasturage and requires variation of position each morning only. A rope or cord should never be used as a tether on account of shrinking and kinking when wet. Goats thrive best when they have access to brushwood where they can browse on leaves and a great variety of undergrowth.

What is known as "**soiling**"—to my mind a very inapplicable term—has generally to be practised during some part of the year. This consists in keeping the goat confined most of the time to its stall or stable, a necessity when no pasturage is available; goats can be kept quite well in these conditions, but it is very advisable to give some exercise daily, if only in a backyard. In fact, the generality of goat-keepers have only their gardens to fall back upon as the daily food supply of their stock, for though a lawn may be included it cannot long serve for pasturage as it becomes tainted, and in that condition it is prejudicial to the animal's health. Pasturage when provided must be ample, at least an acre for three goats to give constant change, and even then it should be limed every alternate year.

This class of stock thrives and gives good milk on coarse vegetable matter which would otherwise be wasted, such as leaves of greens, the haulms of peas, the stalks and leaves of Jerusalem artichokes, etc. Ivy is always greatly relished, though some people think it poisonous to goats, and the berries may at times be so. Hedge clippings, dried leaves, and many so-called weeds, make excellent food. But these articles must be *absolutely clean*, for goats will refuse anything that has the slightest dirt upon it. They even reject leaves that another goat has started to eat, and, unless very thirsty, will drink no water which is the least greasy or has any matter fallen on or into it. In addition to these waste materials, however, a milking goat requires some hay, oats, and bran, especially in winter, and, where cost is no consideration, linseed cake or other concentrates may be added with advantage to the yield of milk. Goats, like human beings, vary in their appetites, and whilst some are free feeders others will pick over their food and be fastidious. A daily supply of 3 lb. of hay, about 9 lb. of roots, or the same weight of green food as described, makes an average ration. Bran may be supplied in two large handfuls and oats from 4 to 6 oz.

Hay and green stuff should be placed in a rack and the concentrated food should be given at milking time in a pail. No such food should be placed in any receptacle that contains the remains of the previous meal or the goat will in all probability refuse to touch it, and unless in a pail that cannot be lifted out it will be viciously upset on the ground.

At least three meals a day should be given, but four are preferable. A lump of rock salt should be always kept in a box within reach of the goat; and water, fresh and clean, offered at least twice daily. Hay is mostly given as the last meal at night, but should also be supplied during the day if much green fodder is given to correct any tendency to looseness of the bowels. Where pasturage cannot be supplied it is a good plan to take the goats out for a walk in the lanes during the spring and summer months to browse on the grass and hedgerows.

Rearing Kids.—As most people keep goats with the sole object of supplying milk to their households, it hardly pays to rear kids unless they are from really good milking dams. At the same time there is usually such a fascination for these little creatures on the part of the family that it is very difficult to do the wise thing. Male kids, however, unless of an exceptionally good milking strain, should be slaughtered at birth, as they are rarely worth their cost to rear and are often very troublesome customers as they grow up. For kids to do well and become fine stock they must have a good supply of goat's milk for seven or eight weeks, and they will be all the better if the period can be extended for three months. If intended for future milking stock their value in that direction will greatly depend on the care bestowed on them in their early days. After an ample supply of milk the next matters of importance are plenty of exercise and as much sunshine and open air as can be accorded to them. When they are weaned they should be accustomed to as great a variety of food as possible, and following a milk diet nothing produces bone and rapid growth better than oatmeal porridge. To encourage constant exercise, piles of logs or lengths of timber should be arranged on which they can climb and jump from and to the ground. The antics of these nimble little creatures are often very amusing and their sure-footedness most surprising. They will often jump on to the roof of an outhouse and run along the ridge like cats. Tethering in the case of kids should be delayed as long as possible.

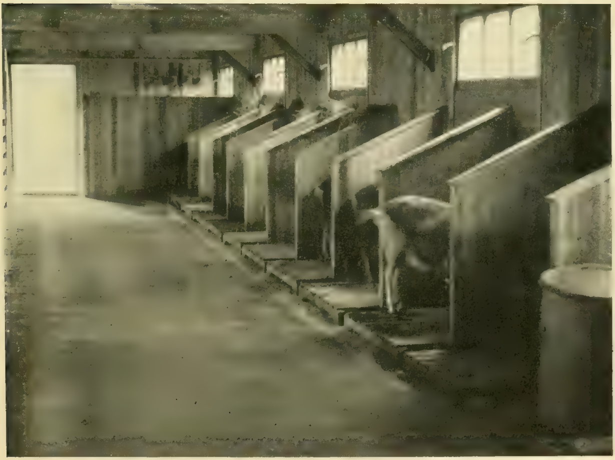
Male kids may be fed on milk up to a fortnight old and then killed for the table, being at this period a most acceptable dish, though not a cheap one at the present value of milk. When the goat's milk is much needed for household purposes the kids can be fed after three weeks more economically by a combination of milk and calf-meal gruel, introducing the latter in small quantity at first and gradually increasing it afterwards. The kid may be taught to drink this from a pan by dipping a finger into the liquid for the little creature to suck; but it is better to bottle-feed it from birth, using for the first fortnight an ordinary infant's feeding bottle with teat and supplying first the goat's milk and later the substitute. The following conditions must be carefully observed: (1) give only small quantities at a meal, removing the bottle as soon as any "bulging" is at all noticeable; (2) adhere strictly to new milk temperature; and (3) keep bottle and teat scrupulously clean, washing it in hot water each time after using and exposing it afterwards to fresh air. At the expiration of a fortnight an ordinary bottle holding a pint or more should be used with a strong lamb's teat, as the infant bottle teat soon gets bitten through and allows too much milk to be swallowed at a time.

Plate CCXVII. A depicts a group of kids, the property of E. A. Walmisley, some of which have since become famous as prize-winners. They are being fed with the bottle by two little children. Note the length and depth of body of the white kid next to the little boy, and the exceptional size of the tassels or wattles on the neck of the black-and-white next to the little girl, these being nearly always present in goats in which Swiss blood predominates.

Milking.—This is quickly learned by children, but not so easily by the grown-up whose hands are less pliable. A practical lesson is better than any amount of written directions. The great thing is to extract the milk rapidly and to make sure of getting every drop on each occasion. Here again cleanliness is an important factor, and all vessels used, whether as milking pails or to contain the milk after being drawn—when it must be passed through a cloth to remove loose hair and dirt—must be free from the least taint that will impart a flavour to it.

The Continental way of milking a goat is nearly always from the rear, drawing out the udder from between the hind legs. This is only convenient when the bag is long and narrow, as it is with the Maltese goats. In England the milker usually sits at the side of the animal. The process of drawing the milk is not a difficult one when the teats are of a size to be easily grasped, but it is tedious when these are so small that a constant stripping process has to be resorted to, using just the thumb and forefinger instead of the whole hand. It will always be found much more convenient to milk a goat that is mounted on a raised bench, than one standing on the ground. This bench should be about 18 in. high, and be furnished with an arrangement for holding a pail with food to keep the animal quiet. When goats are specially restless and troublesome, they may be kept under better control by erecting at the head of the bench stocks on stanchions in which

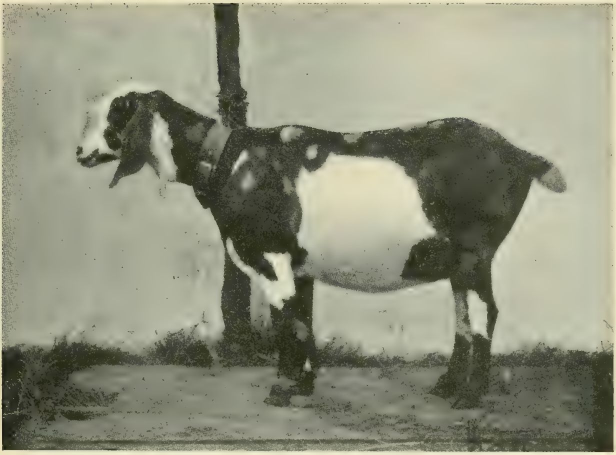
A. GROUP OF PRIZE KIDS, ALL BOTTLE-FED.
British Alpine and British Saanen.
From the herd of G. A. Walmisley.



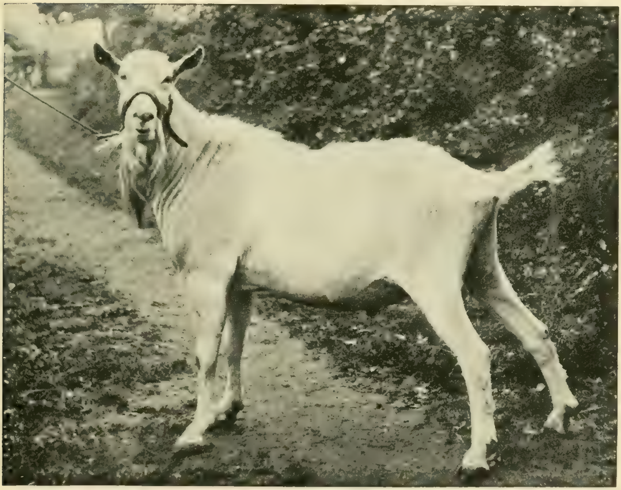
B. STALLED GOATS' HOUSE, INTERIOR.
[*By permission of Mrs F. J. Browell.*

A. Prize Nannie and Kids.
Owned by the late Baroness Burdett-Coutts.

B. British Toggenburg.
Gallon Milkers in the herd of Mrs Potton—"Leazes Treasury," H.B. 2458, bred by Mrs Straker; "Rayleigh Donna" and "Primrose" (Anglo-Nubian-Swiss), and "Dunwich Jade" (Anglo-Nubian).

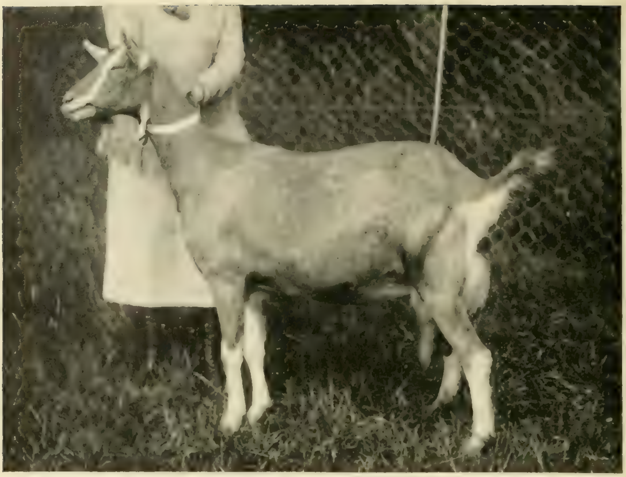


A. Nubian Goat of the late King Edward.
Loaned by His Majesty to the B.G.S.

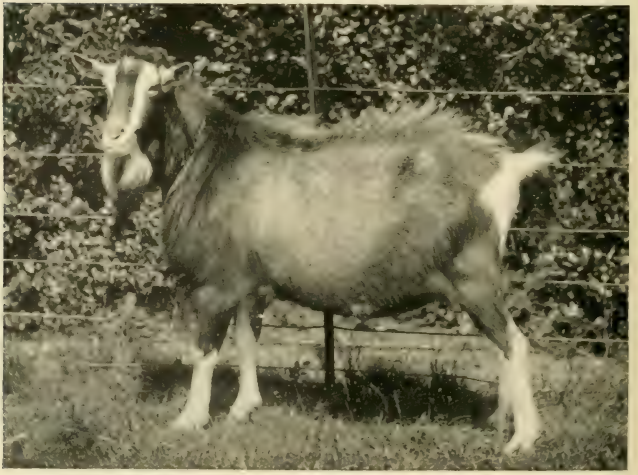


B. Anglo-Nubian-Swiss, "Champion Proud," H.B. 2853.
Champion male, 1919. Owner, Miss E. M. Pope, Bashley Lodge, New Milton, Hants.

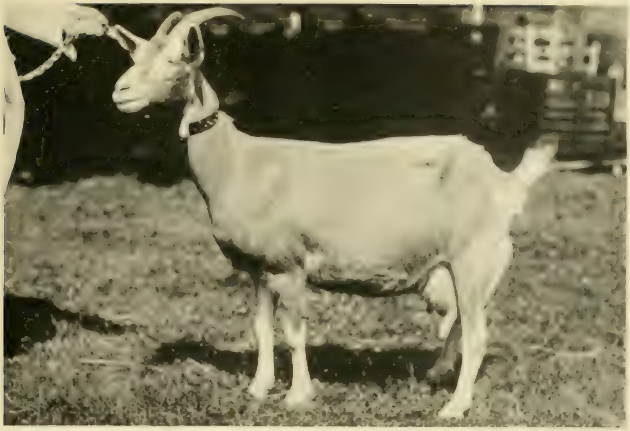
PLATE CCXX.



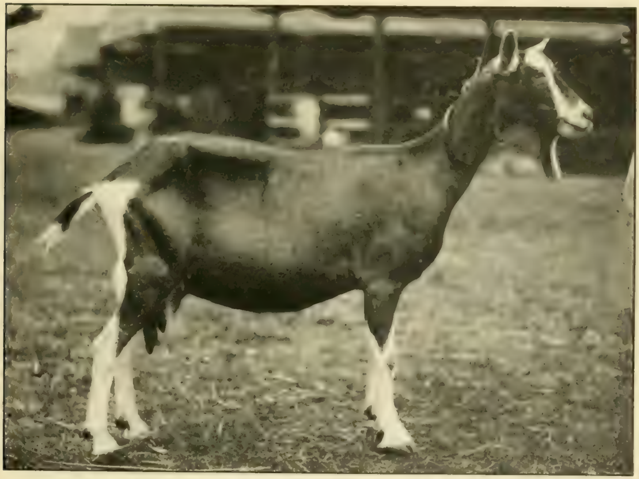
A. Swiss Goat, "Rayleigh Harebell," a 5 quart (nearly). First kidded (in its first lactation), from Mrs Potton's herd.



B. "Oadby Emperor," Toggenburg Type, a "Dagger Billy." Bred by Mrs Billson.

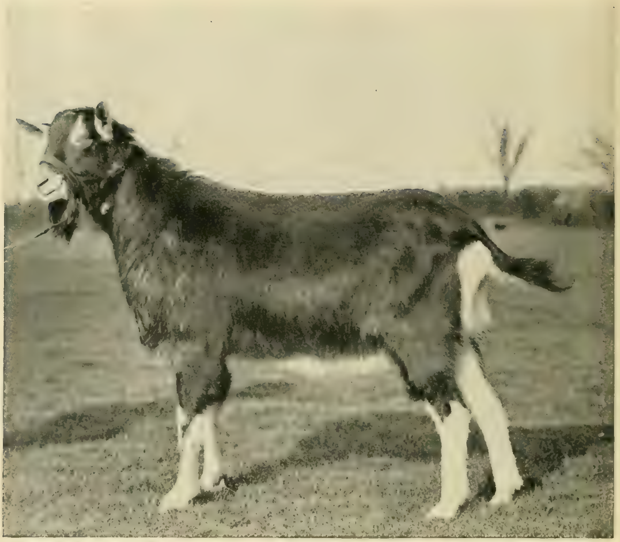


A. "Broxbourne Joan," Q* British Toggenburg.
Her milk record for 1921 showed over a ton of milk.
The property of H. E. Hughes, "Goats," Broxbourne, Herts.

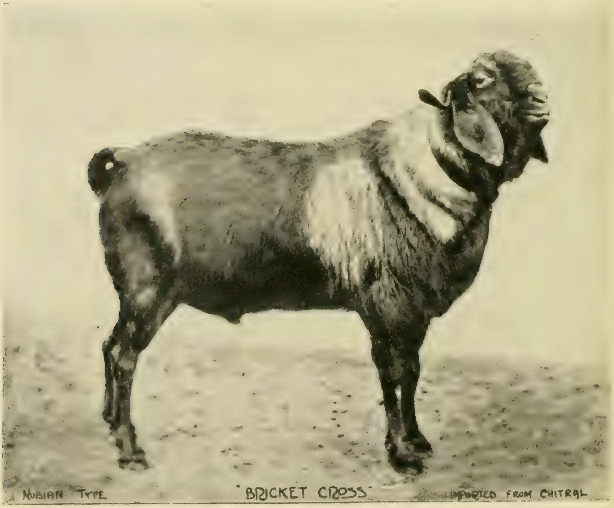


B. Anglo-Nubian-Swiss Nanny Goat, "Withdean Topsy," * Q * 2662.
President's Medal in the Goat Classes at Stirling Highland Show, 1921, gained by the
Baroness Burton, Dochfour, Inverness. Bred by Dr Clutterbuck, Brighton.

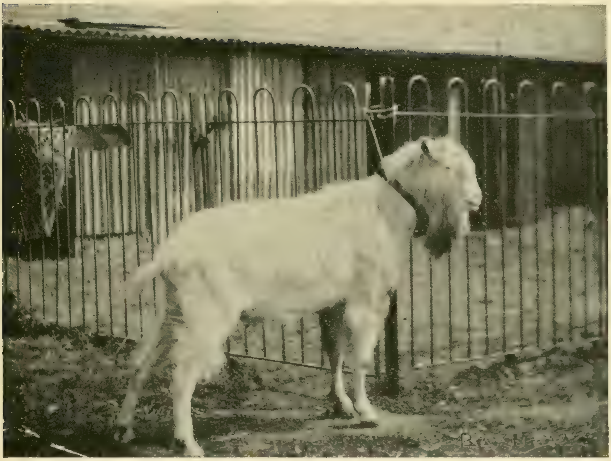
PLATE CCXXII.



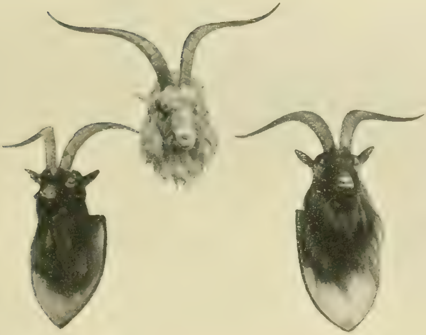
A. ANGLO-NUBIAN-SWISS HORNLESS BUCKLING, "CHAMPION PROPHET OF BASHLEY." H.B. 3775, born May 1919. Champion Male for 1920. Owner, Mrs Arthur Abbey.



B. NUBIAN (Chitral), "BRICKET CROSS," H.B.N. 3. Male goat imported 1904 by Birkbeck Ravenscroft.

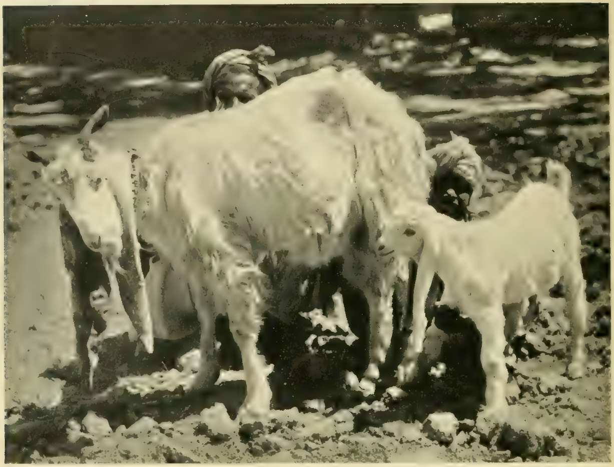


A. "Broxbourne Adam."
The first Saanen male goat bred in England from imported Saanen parents,
by H. E. Hughes, "Goats," Broxbourne, Herts.

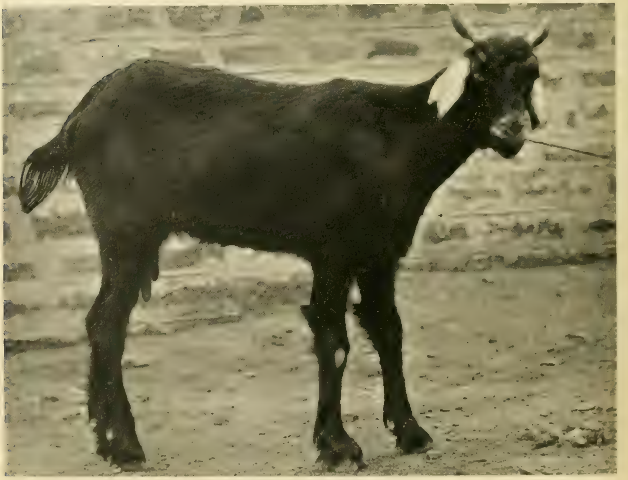


B. Heads of Highland Wild Goats, from Achray, Perthshire. (See p. 832.)
[*Mrs Hinckes.*

Both breeds are unsuitable for Britain. This plate illustrates striking contrasts among goat varieties.



A. Scinde She Goat and Kid, with long fleshy ears.



B. Indawati She Goat, with white ears.

the animal's neck is secured, similar to those in use for cows. "Another practical method of milking is the following: Construct in the corner of a building, or in the angle of a fence, a small raised platform about 4 ft. long by 3 ft. broad and 6 in. high, of wood or preferably concrete, the latter being much more easily cleaned. Place the goat against the wall or fence with its hind quarters in the corner. The milker kneels on one knee—preferably the left—on a bag or small cushion, places the top of his head against the side of the goat just in front of, and above the stifle, and his other knee across the front of its chest, thereby pinning it in the corner and preventing it moving. A large deep pan with a long handle—such as is used for cooking—most conveniently replaces the ordinary milking pail. Milking can thus be performed with both hands simultaneously, or, if the goat is restive, with one hand at a time, the milker holding the handle of the pan with the other. A goat, with a little gentle firmness, soon learns to stand quietly till milked dry, as it is almost impossible for it to kick if the milker's head is held firmly against the stifle. Milking can easily be completed in two or three minutes by this method."

Milking is usually performed twice daily—morning and evening—but when the goat gives over three quarts at one milking, it is often advantageous to have the second milking at midday, and a third the last thing at night.

The great thing in drawing the milk is to do it rapidly and without cessation, and so it is advisable to use a receptacle large enough to hold the full yield. Rapid milking nearly always results in a larger supply, and hence an expert in the art will often develop a goat into a better milker.

The next important consideration is to empty the udder completely at each "meal," not only because this encourages the glands to secrete the fluid, but because the quality of the milk as regards its butter-fat or cream constituent improves towards the end, the last drops being always the richest.

A further matter needing attention is to milk at the same hours, as far as possible, every day. Irregularity in this respect has nearly always a bad effect, and so it is one of the practices to adopt when a goat is difficult to dry-off.

Yields and Quality of Milk.—Twenty years ago three quarts of milk a day was considered a tip-top yield for a goat, and though we heard occasionally of a gallon, it was never demonstrated in public. The 1919 record in milk production was reached by a goat named "Tremedda Seléné" (Q *). In the competition at the Cardiff Show of the Royal Agricultural Society, this animal, a cross-bred showing Swiss type, after being in milk 115 days, gave 8 lb. 2 oz. in the morning and 6 lb.

in the evening, or 14 lb. 2 oz. as the day's yield. Another 14 oz. would have made 15 lb., or *six quarts*, a stupendous figure! Unfortunately Seléné died in the spring of 1920. The second prize on that occasion was carried off by her stable companion "Tremedda Lalage" (Q*), which gave 12 lb. 2 oz. in the day, or nearly five quarts.

The first two goats were the property of Miss Amici-Grossi, a lady then residing at St Ives, Cornwall, who, it is stated on good authority, refused £200 for the former of these two remarkable milkers at the Dairy Show. There are not very many milkers in this country that can give over a gallon, but the number is increasing annually. The common goat does not give much more than three pints to two quarts a day, but the latter is quite a good and a very profitable yield. It is not so much, however, the quantity given for a limited period as the prolonged lactation that denotes the exceptional milker. There are many common goats in Ireland that give over two quarts a day for some weeks after kidding, but they go dry after six months, whereas the Swiss breeds will continue in profit right up to the birth of their next kids, unless dried-off compulsorily, and this, in such cases, is often difficult of accomplishment. It is always most desirable to give the milk glands a rest for at least two months between the lactation periods.

Among other noted milkers having given or now giving a gallon or more daily, may be mentioned Mrs J. C. Straker's "Champion Leazes Eve"*; Miss Mortimer's "Wigmore Cornflower,"* "Champion Wigmore Topsy,"* and "Cowslip III."*; Mrs Soames's "Pytchley Belle" (Q*); Miss Pope's "Pride" (Q*) and "Prude" (Q*); Mrs Lacy-Hulbert's "Mayfield April"*; Mrs Browell's "Lalage II.,"* bred by Miss Amici-Grossi; and Lady Dunleath's "Crossgar," in her Ballywalter herd of famous milkers. The latest record is that of a goat, "Didgemere Dulcie" (Q*), belonging to a most successful breeder, Mrs Abbey of Didgemere Hall, Roydon, Essex, which, at the Chelmsford Show on 7th June 1922, produced in twenty-four hours 17 lb. 9 oz., exactly 7 quarts; the first milking alone being one pound more than the gallon.

All goats winning a certain number of points for quantity in milking competitions are entitled to a "star," as shown in the list above, whilst those which have also gained points for quality take the prefix "Q" in addition.

Among the exhibits thus distinguished at the Dairy Show alluded to, may be mentioned "Tremedda Seléné" (Q*), "Leazes Pearl" (Q*), "Withdean Topsy" (Q*), "Tiptop Wispa" (Q*), "Broxbourne Fairy Queen" (Q*), and "Nibs" (Q*). All these goats, except the last, which was an ordinary English, were what is known as "Anglo-Nubian-Swiss," being in fact mostly of the Swiss blood, with only a trace of Anglo-Nubian, a combination which wins nearly all the milking prizes.

Two of the most recent successful breeders of heavy milkers are E. A. Walmisley, Mattingley Green, near Hook, Hants, and Mrs H. Potton of Rayleigh, Essex, who—until it died after kidding in March 1922—owned a goat "Rayleigh Daphne," which in 1921 once gave 7 lb. 3 oz. in the morning, 3 lb. at midday, and slightly over 10 lb. at 8.30 the same evening—the biggest yield ever recorded. In Mrs Potton's flock in 1922 there were six milkers producing daily from four to six quarts, viz. "Honeymead Dainty" (Q *), "Rayleigh Primrose," "Harebell," and "Prima Donna" (Q*) (Plate CCXVIII. B). Remarkable proof of the great improvement in milk yield that is going on, was afforded at the Colchester Show of the Essex Agricultural Society on 10th June 1920, when out of fourteen competing animals, no less than six gave over 10 lb. of milk in twenty-four hours, and one actually within 4 oz. of that quantity at a single milking, an unprecedented circumstance at a show. There were other exhibits nearly up to the 10 lb., which had given that yield to the writer's personal knowledge before going to the show, where conditions are far from favourable to milk production.

In goat's milk the quality, by which is generally understood the amount of butter-fat, varies considerably, according to the breed in great measure, but also according to the quantity of milk supplied. Goats whose yield greatly preponderates in quantity usually give a milk deficient in quality, whilst comparatively poor milkers often give very rich milk. As breeds go, the Swiss may be generally classed in the former category and the Anglo-Nubians and English goats in the latter. During the Dairy Shows at the Agricultural Hall, Islington, there have been for a number of years milking competitions for goats; and the milks are all analysed. In 1919 nineteen samples showed over 4 per cent. of butter-fat, eleven over 5 per cent., eight over 6 per cent., and three over 7 per cent.; whilst two Anglo-Nubians had 8·93 per cent. and 9·09 per cent. At the Belfast Show held on 26th May 1920, where "Ballywalter Crossgar" above mentioned took first prize, giving 10 lb. 5 oz. of milk in exactly twenty-four hours, the percentages of butter-fat were recorded from six samples as under: 6·26, 5·92, 5·50, 4·98, 4·94, and 4·92 respectively.

Goat's Milk and Tuberculosis.—However many instances may be recorded of children being infected with tuberculosis from drinking cow's milk, there is no case on record of such a result following the partaking of goat's milk. It is to be regretted that so little attention has been given to this fact by the Board of Agriculture and Fisheries, and by the Special Committees appointed to investigate the cause and prevention of this disease. In the United States of America, the subject has received careful consideration. We learn from the Washington Bureau of Animal Industry that during the eight years from 1907 to 1914 inclusive, the 579,617 goats inspected preparatory to slaughter did not produce a single case of rejection from symptoms of tuberculosis. Indeed Löbe, Rhode, and others (Department of Agriculture, Bulletin No. 68) ascribe to the caprine genus an almost *total immunity* from this disease. This is no new discovery, however; the late Sir William Broadbent, that celebrated English physician of the Victorian era, stated in a lecture in October 1905, "Asses and goats do not suffer from tuberculosis, and the shrewd physicians of past days used to order ass's and goat's milk for persons threatened with consumption." Pages could be filled with recent evidence to the same effect.

Goat's Milk for Hand-reared Infants.—Apart from this, goat's milk has proved itself a wonderful substitute for "mother's milk." It is easily digested and can be retained by a delicate stomach when cow's milk will be rejected. Children thrive on it in a most wonderful manner. Nor is this good effect restricted to the young of humanity! I have given goat's milk to puppies, to rabbits, and to growing poultry with remarkable results, and I have known cats that, having tasted goat's milk a few times, would afterwards refuse the ordinary dairy milk.

Goat's Milk in Domestic Use.—Few indeed are the people who, having once tasted goat's milk in their tea and coffee, in their puddings and in the various other articles of cookery in which milk enters, will return to cow's milk. Whether the goat is a rich or a poor milker, the milk it yields has always a cream-like character, and very seldom is there any peculiar "goaty" taste, provided absolute cleanliness is observed. Those travellers in Switzerland who report unfavourably of the goat's milk have probably drunk this milk in their journeys from vessels that had not been properly washed. The so-called "goaty" flavour is due to the development of picric acid.

Goat's Milk for Cheese and Butter.—Goat's milk is largely used abroad in the making of soft cheese; and in certain districts in France, in particular, such cheeses have considerable demand locally. The most popular are Mont d'Or, Levroux, Ruffec, and St Marcelin; Roquefort, better known in England than the others, is only partly composed of goat's milk, as both ewe's and cow's milk enter into its composition.

Gruyère cheese is *not* made from goat's milk as so many people imagine.

As to butter, I have long considered it a waste of goat's milk to make it into an article which can be bought so much better at the shops. Even at agricultural shows where experts officiate in the dairies and the best appliances are in use, a very poor result is obtained. Samples sent to me in late years, however, from goat-keepers proficient in the art, tend to show that excellent goat's milk butter *can* be made, and if properly coloured—for without this it is as white as lard—it cannot be distinguished from cow's milk butter.

Exhibiting.—People unaccustomed to goats have seldom any idea of the love of mischief that is such a conspicuous element in their character. As soon as goats arrive on a show ground and are herded or grouped temporarily together they start eating off each other's labels, so that if all the owners are not present great difficulty is experienced in distinguishing the exhibits by their numbers. Then, when tied up to their stalls, where innocent secretaries have tacked their catalogue numbers within easy reach of the animal standing on its hind legs, those numbers quickly disappear. Or else when the goats are chained up too near one to the other, butting is at once indulged in. My advice would be: Place all rings into which the chains are fastened within 12 or 15 in. of the ground, and allow at least the following distances between the exhibits: full-sized males 4 ft., ditto females 3 to 3½ ft., goatlings 3 ft., and kids 2½ ft. Run a batten overhead along the front of the stalls 6 or 7 ft. from the ground, nailing the numbers and award cards thereon, but never on hurdles or at the front of the stalls. Use hurdles to separate the full-grown exhibits one from the other; otherwise they may fight, or, if not closely fastened, jump over the hurdle and perhaps get choked or strangled. Never depend on card or linen labels. Metal discs, numbered as ordered, are obtainable from Spratts Patent, Ltd., provided specially for goat shows. These are fastened to the goats' collars by wires. Goats are nearly always sent to a show in crates. See that those crates are marked with numbers corresponding with those of the catalogue, so that they can be identified after the show.

It is a matter of considerable moment towards the success of a goat show to hold it under the British Goat Society's rules, so that it may be officially recognised. To this end several formalities and conditions have to be observed, so that it is advisable to obtain from the Secretary (Appendix A, "Goats") the book of regulations. The names of all winners are published in the Society's *Prize Record*, and this fact enables the goats, under certain conditions, to be entered in the *Herd Book*, which is very often an inducement for an exhibit. At most shows there is at least one milking competition, and this is very desirable for many reasons, the chief being that a chance of winning a prize is given to an animal that is nothing to look at, but has great merit as a milker, points being given for yield according to length of lactation.

Goat breeders wishing to obtain prize stock from the most successful exhibitors will obtain full particulars in the British Goat Society's *Herd Book and Prize Record.* The Society also publishes a valuable *Year Book*, and a *Monthly Circular.*

GOAT DISEASES.

The goat is generally credited with being a hardy creature, able to stand any rough treatment and to thrive where other animals would starve. But however hardy it may be in a wild or semi-wild state, under domestication and particularly since the establishment of highly-bred show stock, it enjoys no general immunity to disease. Most of the goat books supply all the information and advice that is needful on the more common disorders to which the animal is subject. Generally speaking, those attacks to which goats succumb are attributable to carelessness or ignorance, amounting almost to cruelty, such as leaving them tethered out at night, or exposing them to cold wind and rain by day with insufficient food and no shelter. But even under the greatest care and with the most judicious feeding many of our first-rate milkers die quite suddenly, the cause of death being often unknown. The record milker, "Tremedda Seléné," was one of a herd that lived under the most healthy and natural conditions on the moors in Cornwall. She had kidded some few weeks before and was apparently in good health, when inflammation of the udder suddenly set in, followed by pneumonia due to septic poisoning of the system, and in three days she was dead. There is good reason to believe that the high rate of mortality among prize-winning goats is due to the forced feeding many are subjected to, often with food containing albuminoids in excessive quantity.

A great many goats die every year from a strange wasting disease to which no name has so far been given. This corresponds closely to what is known to the veterinary profession as Johne's disease among sheep and cattle, and also to a disease called *Takosis*, which has carried off large numbers of Angora goats in California. There can be no mistaking the symptoms. A failing appetite is usually one of the first signs of coming trouble, often accompanied by diarrhœa, the bowels being generally affected sooner or later. Emaciation sets in, the head and in particular the jaws have a swollen appearance, showing weakness, the breathing is laboured, and the animal grinds its teeth. The general debility and loss of flesh often suggest internal parasites, and cases do certainly occur in which these are the source of mischief, but here the administration of worm powders has no effect. All the visible mucous membranes are pale and anæmic, whilst the coat has that dry, lustreless character commonly called "staring." Post-mortem examinations always reveal a general bloodlessness of the various organs, and the liver presents a shrunken, dried-up appearance. The few cases I have known of recovery from this disease seem to have been due more to the most careful nursing than to medicinal treatment, though the iron and quinine invariably prescribed have doubtless some good effect. Raw eggs, port wine, and everything nourishing and stimulating in the way of food, such as would be given to a human being, have been administered, and in a few—a very few—cases, a cure has been effected. Probably, not one case in a hundred ends in this satisfactory manner, and it has only been on valuable animals that such treatment has been bestowed. As the disease is regarded as contagious, animals so affected should be at once separated from all others and the usual measures taken to disinfect thoroughly the place where sick or dead goats have been kept.—H. S. HOLMES PEGLER,[1] Author of *The Book of the Goat.*

Diarrhœa, one of the most common ailments with goats, may be merely a symptom of some more serious disease, or it may be due to various causes, such as a sudden change of food, especially from dry to succulent; too much green food, especially when grass is very moist and rank; decomposing vegetable matter, or leaves or garden clippings from certain trees and shrubs. Although a simple trouble if taken in time, diarrhœa may become serious if neglected, even sometimes leading on to dysentery. In kids, when hand fed, it is often due to too much milk, or to taking milk from sour vessels.

Symptoms.—The droppings become moist and too frequent, and the hind-quarters become soiled with liquid excrement; there is often a falling off or a complete cessation of appetite and rumination, the patient cries frequently, and if the disease is not stopped in time it rapidly leads to loss of milk and loss of flesh, or even great emaciation.

Treatment.—Withhold all food for twelve to twenty-four hours and give a purgative. For a milking goat this should consist of 4 to 6 oz. of black treacle and an equal quantity of sweet oil, to which may be added 2 to 4 drms. of sal volatile or a like quantity of sweet spirits of nitre. If the trouble does not cease in a couple of days, astringents may be given, such as prepared chalk, 1 drm., powdered catechu, ½ drm., powdered ginger, 20 grains, and powdered opium, 6 grains, administered in half a pint of well-boiled flour gruel. This may be repeated two or three times a day if necessary. The best food for a few days is old hay, and grain should be avoided till the trouble ceases. If the goat is not in milk, Epsom salts in doses of 1 to 3 oz. may be given instead of oil and treacle. Should the trouble continue, it is best to consult a veterinary surgeon. Kids should be treated in much the same way, reducing the doses to one quarter, and to one half for yearlings. Equal parts of lime-water may be added to the milk for young kids after administering the purge.

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[1] The remainder of this chapter was written by D. S. Rabagliati, F.R.C.V.S., Ministry of Agriculture, Cairo, Egypt.

Foot Rot, an inflammatory or even suppurative condition of the structures of the hoofs and interdigital regions, is usually caused by neglect in not paring the hoof and allowing the wall to overlap the sole, whereby stones and dirt work their way in. Inflammation is set up and may if neglected lead on to suppuration, or even to casting the hoofs. The condition is much more likely to occur in goats kept on wet pastures, or in dirty stables where the bedding becomes tainted with urine. The *symptoms* are lameness in one or more legs, heat and pain in the affected hoofs, with redness and swelling of the interdigital region and around the coronets. A contagious form may occur. There may be separation between the horn and the skin. If the fore feet are affected the goat often goes on its knees and lies a great deal.

Treatment.—Carefully pare away all overgrown and surplus horn. If there is great pain, a hot linseed or bran poultice may first be applied, to which a little disinfecting fluid, such as creolin or izal, may be added. The hoof must be carefully washed with warm water and soap, and dressed with a solution of carbolic acid, 1 part, glycerine, 20 parts; or an ointment composed of blue stone, 1 part, and lard, 9 parts. Stockholm tar also makes a cheap and efficient dressing. Trouble will be avoided if the feet are pared monthly and washed occasionally with a 10 per cent. solution of blue stone.

Sore Teats. — The delicate skin of the teats becoming chapped, sometimes develops severe cracks and sores. These are mostly seen in goats when the milk ducts are very narrow and great pressure is required to draw the milk. Rough milking and neglect to dry the teats after milking are contributory causes.

Apply a little pure glycerine to the hands before milking, and take great care not to take hold of the chapped parts more than is absolutely necessary. Apply a little boric ointment to the teats after milking, and it may be advantageous to cover the udder with a bag slung over the loins. In very bad cases the use of a milk syphon (p. 350), which should be well boiled before use, may be necessary.

Lice.—Goats when not kept clean are liable to this pest, by contact from affected goats or contaminated premises, brushes, and bedding, lack of grooming and general neglect.

The affected goat is seen to rub and bite itself frequently, the hairs become brittle and break off, making the coat appear very thin. The skin has a dirty scurfy appearance and the nits can be seen attached to the bases of the hairs. Careful examination will reveal the lice themselves on the skin. They are chiefly found on the head, the neck, and the sides of the body, but may occur anywhere. If the weather is sufficiently warm, the goat should be clipped all over. Wash it with warm water and soft soap, to which a little washing soda has been added. It may then be washed over with a 2 per cent. solution of creolin or izal and allowed to dry in the sun or in a warm place. After this, constant good grooming is the best remedy. Care should be taken to see that all the nits are destroyed, as they are much more difficult to kill than the mature lice. A second washing may be necessary, and it is a good plan to sprinkle a little Keating's insect powder amongst the hair occasionally. All soiled bedding should be burnt, and the premises well disinfected and rewashed with lime, to which 5 per cent. carbolic acid may be added.

Mange.—The goat also suffers from sarcoptic mange, due to a mite (*Sarcoptes communis* var. *capri*). Infection always takes place by direct or indirect contagion. The mite is invisible to the naked eye, and as it burrows into the skin, it is very difficult to reach and kill it. The *symptoms* are loss of hair, itching, thickened skin, with great cracks and sores.

When badly affected, the goat rapidly becomes emaciated, and may even waste away and die. Any part or sometimes the whole body may be attacked. If properly treated, and taken in time, mange is curable; but, as the treatment is difficult, a veterinary surgeon ought always to be called in.

Pseudo, or False Tuberculosis.—In some countries a disease with symptoms similar to those of tuberculosis, occurs in goats as well as sheep. It is known as "caseous lymph-adenitis." It is due to the *Bacillus pseudo-tuberculosis ovis* (bacillus of Preisz and Nocard), and is not communicable to man. The *symptoms* are local cheesy abscesses occurring in certain glands of the body, usually pneumonic areas in the lungs leading on to a chronic cough, and when severe it produces unthriftiness, a hard dry coat followed by wasting and sometimes death, the condition often lasting for years before it becomes fatal. (See p. 742.)

A wrong diagnosis of this disease may damage the reputation of the goat as immune to tuberculosis. Goats *may* on some occasions suffer from tuberculosis, but so resistant are they to it under ordinary conditions that the danger may be considered as negligible. In any case of difficulty about disease, the owner would be well advised to call in a veterinary surgeon.

Excerpt from Regulations, British Goat Society, 1922 :—

26. DAGGER MALES.—The sign of a dagger (†) prefixed to the name of a male goat shall designate that such goat is the produce of a dam that has won a star in a milking competition recognised by the Society, and is by a sire which is out of a dam which has won a similar star.

27. STAR MILKERS.—The affix of a star (*) to the name of a female goat shall designate that such goat has received a minimum number of points at a milking competition recognised by the Society, where quality has not been taken into consideration. The affix of a star (*) preceded by the letter "Q" to the name of a female goat (Q*) shall designate that such goat has received at least the number of points named below at a milking competition held after March 1st, 1916, where quality has been taken into consideration. The progeny of such goats which are also winners of such prizes shall be entitled to a second star, or a second Q*, as the case may be, and so on in the case of subsequent descendants. To qualify for the affix of a star (*) or (Q*) not less than the following number of points must be obtained :—(*a*) At a show where quality is taken into consideration, 18 points at two milkings ; the content of butter-fat to be not less than four per cent. at each milking. (*b*) At a show where quality is not taken into consideration, 15 points for three milkings.

Societies affiliated to the British Goat Society :—

The Canadian Goat Society.—G. Pillmer, Victoria, B.C., Canada.
The Coleraine Goat Breeders' Society.—W. McLeese, Fountainvill, Coleraine.
The Devon County Goat Club.—Mrs N. Hamilton, Lowerton, Brentor, near Tavistock, Devon.
The Fife Goat Keepers' Association.—Miss M. E. Duff, Earlsneuk, Earlsferry, Elie, Fife.
The Irish Goat Society.—Miss K. Saunders, Trillick, Co. Tyrone.
The Kent Goat Club.—Miss Bignold, Sparkes Hall, Sutton Valence, Maidstone.
The Lancashire Goat Society.—Mrs C. L. Pickard, Middle Brow Top, Quernmore, Lancaster.
The Norfolk and Suffolk Goat Society.—H. E. Jeffery, Trenance, Diss, Norfolk.
The Sussex County Goat Club.—E. Ossory Williams, The Warren, Moulscoombe, near Brighton.
The United Irishwoman's Association.—Miss Whitty, Lincoln Chambers, Lincoln Place, Dublin.
The West Surrey Goat Club.—Mrs Epps, The Hollies, Pewley Hill, Guildford.
The Yorkshire Goat Society.—Mrs P. Wainwright, Sheepwalks, Pontefract.

CHAPTER XXXVIII

SHEEP DOGS

The Collie Dog—Appearance and Characteristics—Points quoted from Rules of Northern and Midland Sheep-dog Club—Type of the Old English Sheep Dog from the same Rules—Points of the Collie, condensed from Vero Shaw—Sheep Dog Trials.

THE **Collie Dog.**—The common belief that the collie is treacherous, is a calumny upon probably the most valuable and sagacious, mild-tempered and patient, servant of the sheep-farmer. It is quite true that a collie which has been brought up in the wilds may be shy and refuse to be patted or even touched by a stranger, but this is merely the result of training and surroundings upon a highly-strung nervous disposition. Dogs that are well treated are usually extremely sensitive, and seem to be as much discomfited by a moral rebuke—an unkind look, word, or action of his master—as most animals would be by physical chastisement. This indicates an amount of sympathy and good fellowship between the dog and his master, which is quite unattainable even in the relationship which exists between man and such a noble and serviceable animal as the horse.

The mental powers of a collie dog also develop under kind treatment, associated with firm and consistent management and control, such as is necessary in training a dog to work so that he will obey his master's call, and understand and act in obedience to his master's sign or gesture. When near at hand the word and look of the master form the chief means of guidance, but at a distance the whistle and motion can alone be relied upon. The period of life at which a dog is most susceptible of learning is when it is between six and twelve months old. A dog which is descended from working parents is usually more easily trained than one which is sprung from a fancy showyard strain which has not been accustomed to work. It is a question not determined how much this is due to want of training in successive generations, and how much to the persistent in-breeding which is carried on among the best show-dogs. Though in-breeding is useful in preserving a show-yard type, it undoubtedly tends to spoil the temper and disposition for training and for work. Good show-yard quality is, nevertheless, not incompatible with first-rate working performances. There is no reason why attention should not be paid to both important characteristics, or why they should not be combined in one and the same animal.

The International Champion, "Bellhaven Laund Logic," won ten championships when in England for his owner, and was exported to the United States in February 1922, where he speedily became an American champion. He also breeds champions, for at the great show at Madison Square Gardens, New York, the champion bitch was sired by "Logic," and a son of his, "Laund Lauder," won twelve firsts and championship at Crufts, February 1922, and four months later, another puppy by him, "Laund Lectric," won championships at Cardiff and Reading.

In describing the **external form or figure of the collie dog,** it may be said, generally, that the points nearly correspond to those of a hunting horse. The shoulders should be oblique; the withers narrow or sharp; the hind-quarters long; the chest deep to give abundance of lung-room, but not wide, else the animal cannot gallop; the back broad, well-coupled, and muscular; the ribs well sprung; and the belly not too much tucked up like that of a greyhound.

The shape and pose of the ears and the tail are regarded as of special importance. Prick-ears, giving the head a foxy appearance, are as objectionable as hanging or lop-ears. The ears should stand up while the dog is on the alert, and the tips should incline slightly forward, forming hollows to catch the sound similar to the hand of an aged person put up while listening, in the familiar manner which calls for no description. The tail should not be too short, or set on too low on the hind-quarters. It should not be carried gaily, but should droop—not, however, lower than the hocks—the point turning slightly up, without the animal being cock-tailed or swirl-tailed; and in the case of the rough collie, it should be covered by a good flag all the way to the tip. A close under-coat of fur extending over the body is of great importance in a working collie, as although the straight hard outer hair, which acts as an outer covering of thatch, may get wet in stormy weather, the under fur keeps the skin warm and dry even when the dog is exposed for hours on the hill-side. Black-and-tan dogs, especially of the darker shades, are frequently defective in the under-coat, owing to there being a stain in the blood from the so-called Gordon setters of comparatively recent times. The coat of the rough collie should not part along the back line while dry, and, if parted while wet, the second coat should still obscure the skin.

The hair on the fore legs is smooth and short in front, but it lengthens into a long silky fringe or feather down the back of the leg all the way to the pastern. The hind legs are free from fringes, and they ought to be set on straight—not cow-hocked, "five o'clock," or V-shaped—else the stifle-joints project and the power of motion is weakened. To be "hare-footed" or long-footed is objectionable. Dogs ought to stand on their toes or be "cat-footed." The collie-claw, or dew-claws, on the hind feet (parts strongly developed in the St Bernard, being in that breed frequently double), should be cut off with a pair of scissors at an early age in the case of dogs which are intended to work. If not removed they are liable to be torn when snow covers the ground and becomes slightly crusted on the top, as is the case when frost occurs after a mock-thaw; the toes of the dog sink, and the claws come in contact with the ragged edges of the broken snow-crust.

The dew-claw seems to be the remains of a natural and no doubt useful appendage, which existed in the common ancestors of some of our most distinct breeds of dogs, as the claws in question have been known to appear in puppies which were first crosses between a clawless spaniel and clawless English terrier, the ancestors of both breeds having been clawless for many generations.

The following descriptive points have been extracted (and edited) from the Rules of the Northern and Midland Sheep-dog Club (see Appendix A, "Dogs"):—

Type of Rough Collie.

Head.—Should be in proportion to dog's size. Skull moderately wide between the ears, and flat, tapering to the end of the muzzle, which ought to be of a fair length, but not too snipey, with only a slight stop.[1]

Teeth.—Strong and white (while young). Any irregularity or abnormality in the teeth is a great blemish.

Eyes.—Of almond shape, set obliquely in the head, and the shade consistent with the colour of the dog. A full or staring eye is very objectionable.

Ears.—Small, and when the dog's attention is attracted, carried semi-erect; but when in repose it is natural for them to be laid back on the ruff.

Neck.—Long and well arched, and shoulders muscular and sloping.

Back.—Rather long, strong, and straight, the loin slightly arched, and the chest fairly deep, but not too wide.

Fore legs.—Straight and muscular, with a fair amount of bone. The hindlegs should be rather wide apart, with stifle well bent, forming sickle-hocks.

Feet.—Compact, knuckles well sprung, claws strong and close together; pads cannot be too hard.

Coat.—Should consist of a long straight outer coat, as hard as possible, with a dense growth of under-coat. The hair on thighs and tail should be as abundant as possible, but short and smooth on head and ears and below the hocks. A long frill and handsome mane, finishing with cape on the shoulders, is very characteristic of the breed.

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[1] The indentation posterior to the zygomatic arch.

Symmetry.—The dog should be of fair length on the leg, and his movements active and graceful.

Height.—Dogs, 22 to 24 inches ; bitches, 20 to 22 inches.

Tail.—Of medium length ; and when the dog is standing quietly should be slightly raised, but more so when excited.

Type of Smooth Collie.—The smooth collie should be the same in every particular as the rough collie, excepting the coat, which should be short, hard, and dense (Plate CCXXVI.).

Type of Natural Bobtail Rough Collie.—The natural bobtail rough collie is the same in every particular as the rough collie, with the exception of a natural bobtail.

Type of Natural Bobtail Smooth Collie.—The natural bobtail smooth collie is the same in every particular as the smooth collie, with the exception of a natural bobtail.

Note.—In all cases of bobtails, a docked tail will disqualify.

Scale of Points.

Head	25
Ears	15
Body	10
Legs and Feet	15
Coat	25
Tail	10

Type of the Old English Sheep Dog.

Skull.– Capacious, and rather squarely formed, giving plenty of room for brain power. The superciliary ridge should be well arched, and the whole well covered with hair, as defined in "coat."

Jaw.—Should be fairly long and square. The "stop" should be defined, but not to a great extent.

Eyes.—These, of course, vary in different colours of dogs. In the dark-blue shades they should be dark brown. In the lighter colours they will be found to follow them, and become paler in shade, while where white predominates a " wall " or marble eye may be considered typical.

Nose.—Always black in colour ; fairly large and capacious.

Teeth.—Strong, firm, and regular. Any inherited irregularity or abnormality is a blemish. Working dogs inclined to bite the sheep often have their incisors broken off. This is in no way detrimental.

Ears.—Medium sized, and carried close to the head, coated with hair of a moderate length.

Legs.—The fore legs should be straight and possess plenty of bone. They should remove the body a medium height off the ground without approaching legginess. They should be well coated all round.

Feet.—Moderately large, round toes, well arched, and pads capacious and hard.

Tail.—This is a most important point in the Old English Sheep Dog. Without a doubt many dogs are bred without the slightest approach to a caudal appendage ; while, on the other hand, some in the litters will be found with half, three-quarters, and whole length tails. The breeding of those without tails should be encouraged and be persevered with, and be given preference to in judging, provided the dogs are good elsewhere. A tail of any length takes away the appearance and the "corkiness"[1] of the dog. A docked dog can generally be detected by the bluntness at the end of the stump.

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[1] Compactness.

Neck and Shoulders.—The neck should be fairly long, arched, and graceful, and well coated with hair. The shoulders should be set on slopingly, and the dog generally be found to stand lower at the shoulders than on his hind-quarters.

Body.—Rather short, and very compact. The ribs should be well sprung, and the brisket deep and capacious. The loin should be very stout, and to a certain extent arched, while the hind-quarters should be bulky, and the hams densely covered with a coat very often of a softer and more woolly description than is to be found on other parts of the body.

Coat.—Profuse, and of a good texture, *i.e.*, fairly hard and strong. There should also be a double or under coat.

Colour.—Varies ; but preference should be given to dark-blue, light, or pigeon-blue and steel-grey dogs. The colours are generally intermixed with white, which imparts to the dog a more attractive appearance.

Height.—Fair stand and measurement at the shoulder, from 20 inches upwards. The bitches, of course, smaller than the dogs. Great height is not to be encouraged, for it takes away the corkiness and cobbiness (compactness) of the dog.

General Appearance.—He is a strong, compact-looking dog, profusely coated all over. He has a peculiar springing style of movement and is thick-set, muscular, and able-bodied, with an intelligent expression.

Scale of Points: Total, 100.

Head	10	Ears	5
Jaw	5	Legs	10
Eyes	5	Tail (undocked)	10
Nose	5	Neck and Shoulders	10
Colour	10	Body, Loin, Hind-quarters	10
Teeth	5	Coat	15

The **Tortoise-shell Collie** is a very old kind. A great number of them are wall-eyed or light-eyed, and they are said not to go blind.

Condensed Enumeration of Points of the Collie, from Vero Shaw's *How to Choose a Dog and How to Select a Puppy.*[1]

Points.—*Head* long (some specimens measuring fully 11 inches from the occipital bone to the tip of the nose), rather narrow and flat at the top ; *muzzle* tapering but not snipey, and the mouth perfectly level, undershot or overshot specimens being badly handicapped. *Eyes* of fair size, dark hazel in colour, and soft in expression. *Ears* small, fine, and carried semi-erect. *Neck* fairly long. *Shoulders* sloping, and free from lumber. *Chest* not too wide, but of considerable depth. *Body* broad in back, and muscular about the loins. *Fore legs* straight, muscular, and well set on under the body, not out at shoulder. *Feet* small and round. *Hind legs* well bent at the stifles. *Tail* scimitar-shaped and carried low. *Coat,* the under-jacket is short and very close, as dense as sealskin, whilst the outer coat in the case of long-haired specimens should be harsh to the touch and dense enough to resist all sorts of weather. In smooth-coated collies it is equally hard, but quite short. The feathering on the legs should not come all the way down to the ground. *Colours,* the most fashionable are sable, sable-and-white, black-

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[1] See also *The Collie,* by Dr O. P. Bennett (President, Collie Club of America) and C. H. Wheeler, Washington, Ill. O. P. Bennett, 1917, and *Famous Collies,* 1877-1917 (Bennett), The Washington Pub. Co., Washington, Ill.

and-tan, and black, tan, and white; pure blacks and pure whites are occasionally seen. When tan is visible it must be of a pale shade, deep or mahogany tan and heavy ears being indication of Gordon setter blood.

Average weight for a full-grown dog	55 lb.
„ „ „ bitch	45 „
„ puppy 12 months old	50 „
„ „ 9 „	45 „
„ „ 6 „	35 „
„ „ 3 „	25 „
„ „ 6 weeks old	9 „

Points to look for in a puppy six weeks old.—Head as flat as possible and strong muzzle; ears set on top of the head, small, and not too thick; eyes medium-sized, not goggle; straight legs and big strong back.

Points to look for in a puppy six months old.—Skull flat and muzzle moderately wide, avoiding a soda-water bottle-shaped head and muzzle; ears should be erect with a slight fall inwards at the tips; sloping shoulders; a deep roomy chest; broad loins; sloping quarters, and sickle-hocks. A dense coat is a desideratum, but much depends upon the time of the year. Avoid a gaily-carried tail and an overshot or undershot mouth.

Average age at which the breed arrives at maturity.—A good collie will be at his best at three years. Many specimens are excellent at ten or twelve months, then go off and get coarse in skull. Bitches mature and go off sooner than dogs.

Sheep Dog Trials have for many years occupied a good deal of attention and interest in certain localities of the United Kingdom; and thanks to such men as Edward W. H. Jones,[1] in Wales, and G. F. Bowden, of Somersal, Derbyshire, the method of competition is becoming more and more systematised. Trials have become popular in America, where a considerable number of the best British dogs have recently been taken.

"**The prescribed work or task,**" says Jones in his excellent little book, "is generally as follows:—Three sheep being set at liberty on a spot some half-mile distant from the shepherd and the dog, out of the dog's sight, and even sometimes out of the sight of the shepherd also, the dog has (1) to go to find the sheep; (2) bring them, over a course more or less beset with natural and artificial difficulties, to the shepherd, who is restrained from proceeding over a certain boundary to the assistance of the dog, and, with the shepherd's assistance when within this boundary, to drive the sheep to a small enclosure; and (3) pen them within a certain specified time—generally ten minutes." Out of a total of 60 points, the find = 18; the return = 30; and the penning = 12.[2]

Plate CCXXVI. B shows **good working collie dogs** that took little training. "Ken" was sired by Ben Murray's "Tam," a cup-winner at many trials. "Mark" is a grandson of "Herdsman's Tommy," another trial winner: photographed with Mary Anderson, daughter of R. Anderson, shepherd, Stenhouse, Tynron, Dumfriesshire, in the Author's native parish.

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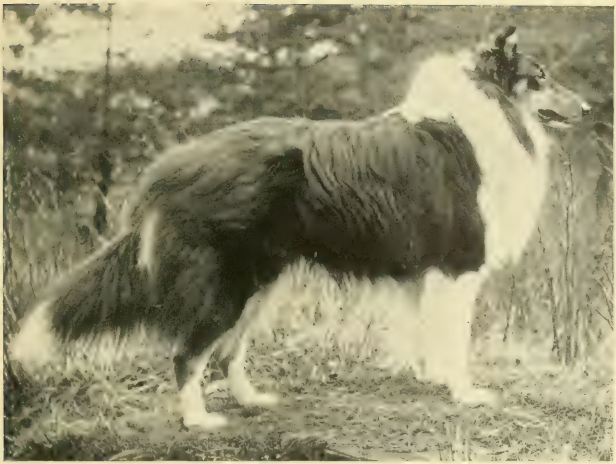
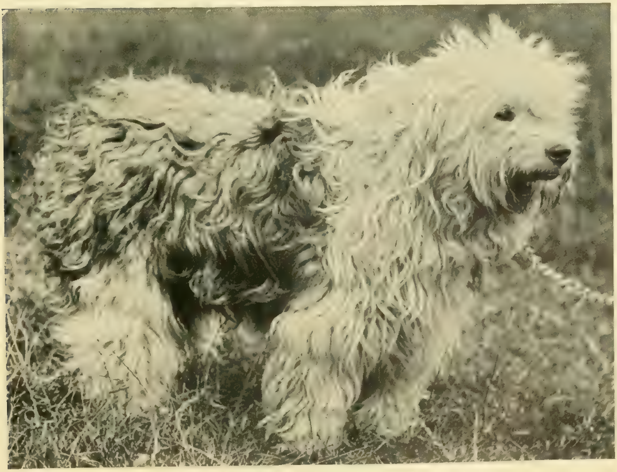
[1] Author of *Sheep Dog Trials: their standard of adjudication, origin and progress; together with the Sheep Dog: its history, varieties, points, breeding, and training.* Printed at the "Brecon and Radnor Express" Office.

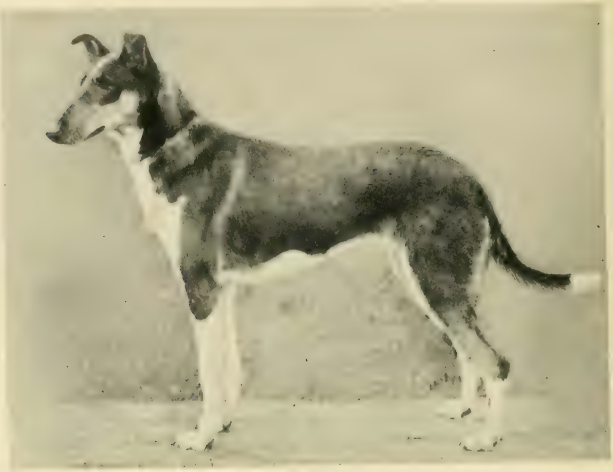
[2] Interesting details are also to be found in *Owd Bob, the Grey Dog of Kenmuir*, by Alfred Ollivant (Nelson's Library).



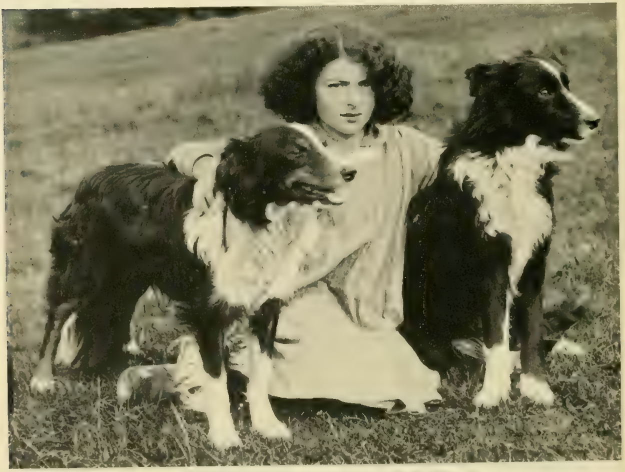
A. Collie Dog Champion, "Wishaw Leader."
A well-known prize-winner. Owned by Robert Tait, Auchenstewart House, Wishaw.
[*C. Reid, Wishaw.*



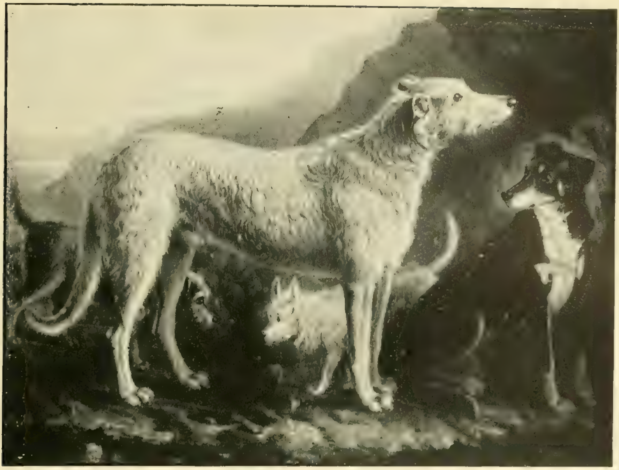
B. Old English Bobtailed Sheep Dog.
[*J. T. Newman, Berkhampstead.*



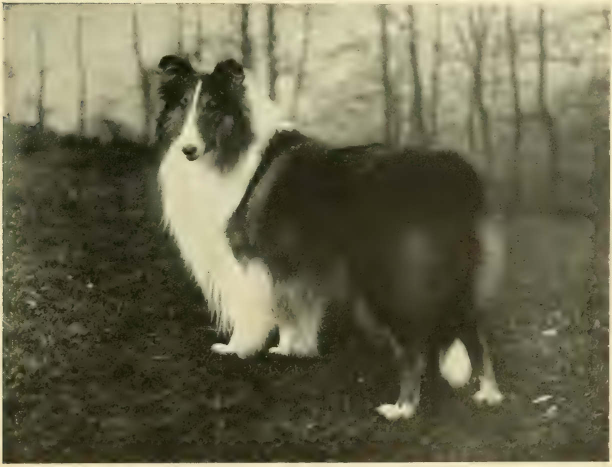
A. Collie Bitch, "Stanley Elite" (Smooth Coated).
Frequently champion and winner of the 60 guinea Trophy at the Collie Club Show, Manchester, 1917. Bred by George Watson, Sunfield, Morpeth, Northumberland.
[*Baskerville, Manchester.*



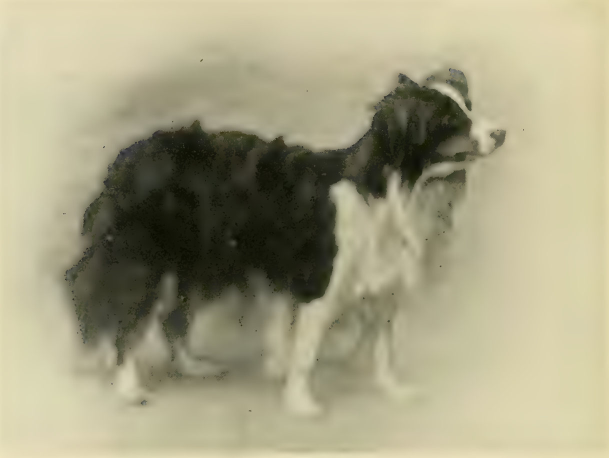
B. Collie Dogs—Working Type—(1) "Ken," black and tan (2) "Mark," black and white, Trial Winners, and Mary Anderson, daughter of R. Anderson (Owner), Stenhouse, Tynron, Dumfriesshire.
[*C. Reid, Wishaw.*



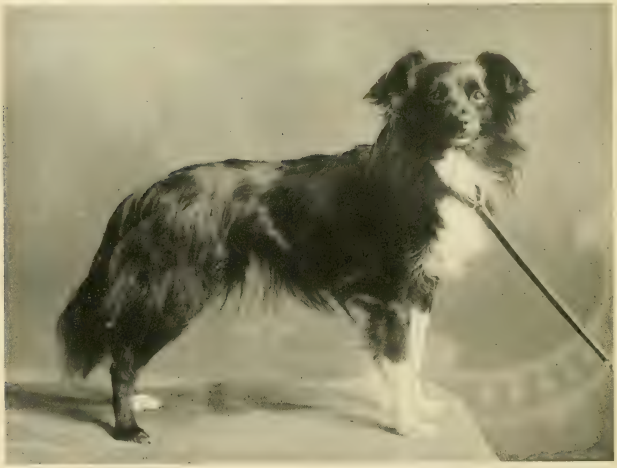
A. GROUP OF SCOTCH DOGS.
Collie from Tweeddale, Scotch Deerhound, Otter Terrier and Scotch Terrier.
[*From the Low Collection of Paintings in Edinburgh University.*



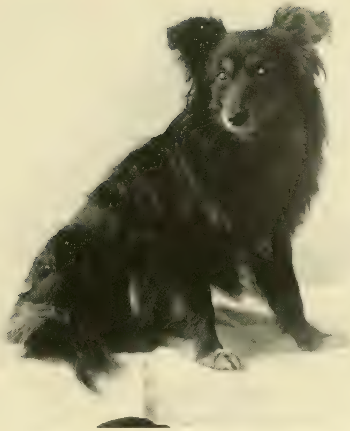
B. COLLIE DOG, "BELHAVEN LAND LOGIE." International Champion.
Bred by Wm. W. Stansfield, Laund House, Rawtenstall, Lancs.



A. Shetland Sheep Dog (♀) "Vickie." Registered in the Kennel Club as "Pickie."
Sire "Rip of Mountfort," second grandsire "Wallace," granddam
"Lerwick Mona" from "Lerwick Jane." The property of
Miss Lily C. Mutch, 4 Hilton Road, Aberdeen.

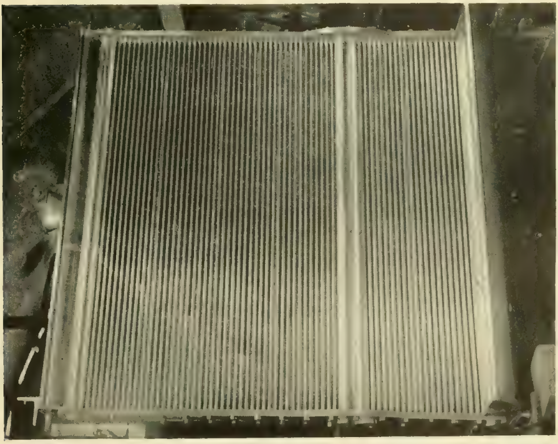


B. Shetland Sheep Dog (♀) "Erica."
Prize-winner and typical of the working type. The property of Miss M. Grey,
Bowsey Hill, Henley.

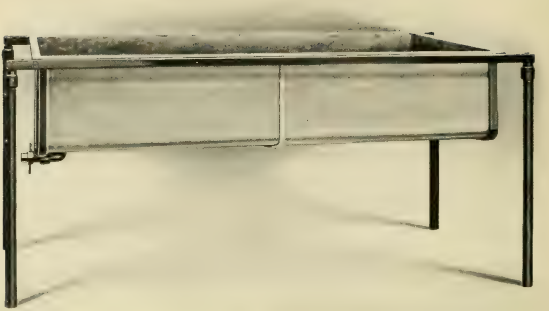


A. Shetland Sheep Dog (♂) "Dougie," at 9 months.
Colour, black, tan and white. Sire "Peat," dam "Queenie of Redbraes." He started the famous prize-winning type which, under the direction of Donald Macgregor, has made famous the kennel of Miss B. Balfour-Melville, Pilrig House, Edinburgh.

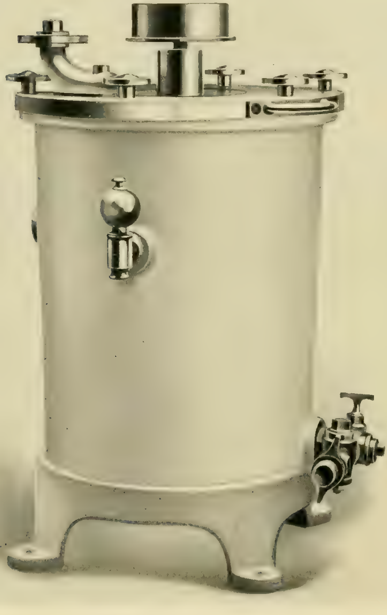
[*Louis Saul Langfier, Limited, Edinburgh.*



B. A Vertical Compound Capillary Cooler
With two divisions (*a*) the top portion cooled by the circulation of water, and (*b*) the lower portion cooled by brine from the refrigerating machine.

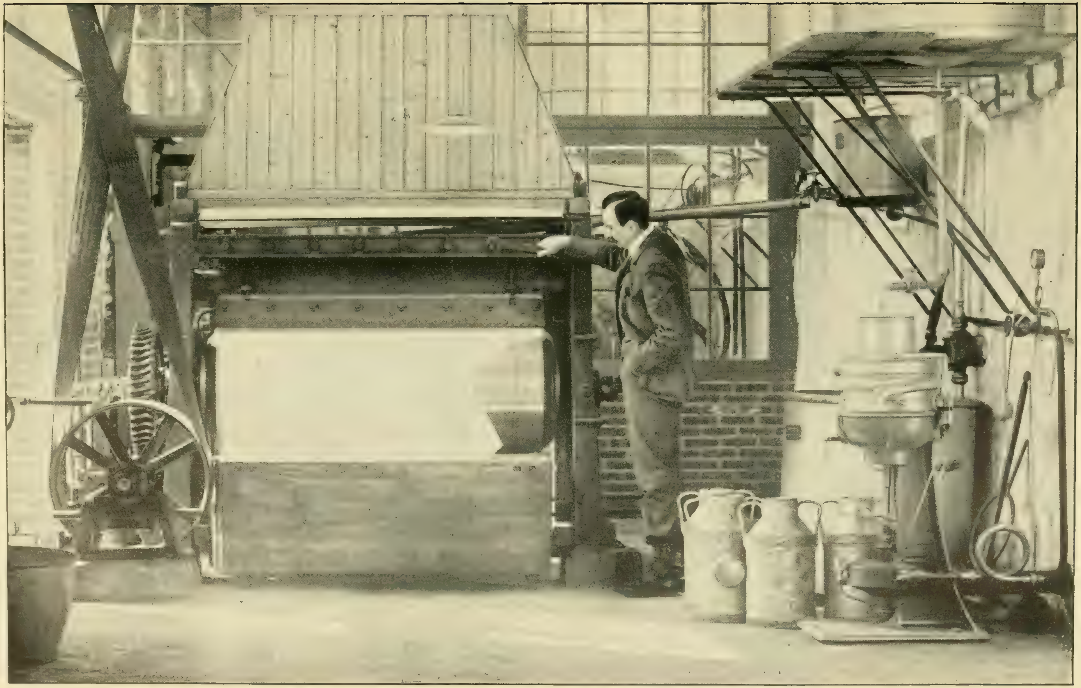


A. Practical Milk Receiving Tank.

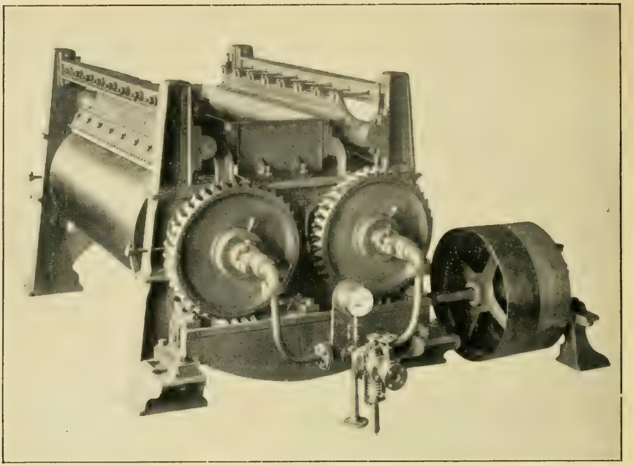


B. Modern Pasteurising Plant.

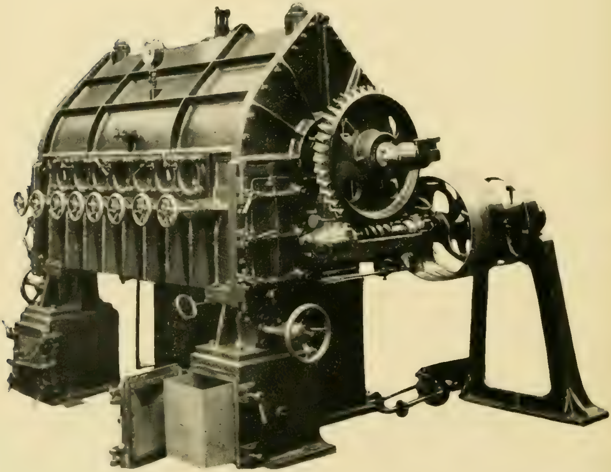
The milk enters at the bottom of the Steam Jacketed Pasteuriser, and ascends by means of the centrifugal effect of paddles driven from the single flanged pulley shown on the top.



Just-Hatmaker's Machine for Drying Milk. (See Appendix C, p. 798.)



A. James Milne & Son's (Ltd.) Open Drying Machine—Twin Cylinder Type.



B. James Milne & Son's (Ltd.) Vacuum Drying Machine—Single Cylinder Type.
Address: Engineers, Milton House Works, Abbeyhill, Edinburgh.

The Shetland Sheep Dog, once known as the "Shetland Collie," had its name officially changed when it was admitted to the Kennel Club for registration in 1909. It is locally called the "Sheltie," the "Perie" (little) collie, and the "Toonie" dog. Little authentic is known of its history, but it is supposed to have come in fishing fleets which visited Shetland in the summer from the Faröes, Norway, Sweden, Denmark, Holland, and Scotland, so it undoubtedly had a mixed origin, which, associated occasionally and locally with intense in-breeding, led to the occurrence of many mongrel and degenerate specimens, which are now being eliminated under the influence of the various Shetland Sheep-dog Clubs. Whatever the mixture of blood may have been, it included the "Yakki" dog from Greenland, which left its mark in a black muzzle, large prick-ears, and heavy brush of a tail. The true type of the Shetland sheep dog now aimed at is the rough-coated Scotch collie—the points being the same—but in miniature, standing between 13 and 14 inches at the shoulder. The toy ideal was given up in 1913, when the 12-inch maximum height was altered to a 12-inch "ideal." In 1908 the "Shetland Sheep-dog Club" was formed in Lerwick, followed by the "Scottish Shetland Sheep-dog Club" in 1909, and the English Shetland Sheep-dog Club" in 1914. The first challenge certificate was offered at Birmingham in 1914, and was won by Mrs Husband's home-bred bitch "Frea."

"The colours usually met with are black and white, black and tan, black-tan and white, black, sable, sable and white." They were originally crofters' or smallholders' dogs, kept mainly for driving or "caing" off straying sheep or cattle for protection of the crops where fences were unreliable. The sheep dog of the Faröe Islands (seen in Plate CLII. A) has a close resemblance to the Shetland sheep dog, and is intermediate in size between it and the Scotch collie. The Shetlands are active, intelligent, and affectionate, and are likely to be bred in increasing numbers as pets, for which they are admirably suited in every way. Too many of the breed are inclined to be flat-footed, a defect which careful breeding will eliminate. Indebtedness is acknowledged for much of the foregoing information to *The Shetland Sheep Dog*, by Miss Beryl Thynne, London; Illustrated. Kennel News Co. Lim., 56 Ludgate Hill, E.C. 1916.

SOME COMMON MALADIES OF DOGS.

Distemper is a contagious disease, due to an ultra-visible microbe. It affects dogs, cats, ferrets, foxes, and wolves. Usually only the young are attacked, and very generally one seizure secures immunity. The first symptoms are commonly slight discharge from nose and eyes, coughing or sneezing, also occasional vomiting, loss of appetite and dullness. If the skin is carefully examined, a rash may be discovered on the abdomen. Later, depending on the severity of the attack, frequent vomiting and diarrhœa may be observed, or, if the dog has been subjected to wet or cold, rapid breathing, cough, and great prostration, indicating the complication of bronchitis or pneumonia. When the nervous system is attacked there may be epileptiform fits, paralysis, or symptoms of madness.

In the *treatment* of the disease, dieting and nursing are most important. The animal should be kept in a warm, well-ventilated room ; and on no account, even in a mild attack, be exposed to wet or cold.

Milk is the best food, given alone or mixed with an equal quantity of hot water. Milk puddings, Bengers' and Allenbury's foods are also good, varied with beef tea, Brand's jelly or essence of beef. When everything else is refused, a little raw beef pulped by scraping with a sharp knife is often taken. If all food is refused for some days, then (and only then) the patient must be forcibly fed with small quantities of milk and eggs, or Brand's or Valentine's essence of beef several times a day.

Medicinal Treatment.—For vomiting, give five grains of carbonate of bismuth in a little milk three times a day, or teaspoonful doses of a mixture containing citrate of potash, one dram tincture of orange peel, one dram camphor water to two ounces. For diarrhœa, nothing is better than twenty-drop doses of chlorodyne every four hours. If the lungs are affected, brandy should be kept at hand to be given in doses of one or two teaspoonfuls when suffocative attacks come on.

If the eyes are inflamed and there is much discharge, bathe them twice a day in a solution of boracic acid, a teaspoonful in half a pint of warm water. Ulceration of the front of the eye is often seen in pugs and Pekingese, and in other dogs with prominent eyes, when affected with distemper. Then the patient should be kept in a darkened room and a little lotion dropped into the eyes twice a day: — Cocaine hydrochlor, 10 grs.; atropia sulph., 2 grs.; chinosol, 2 grs.; distilled water, 1 oz. During convalescence only very moderate exercise should be permitted for some time—this is a most important precaution.

Typhus of the dog, or distemper of old dogs as it is called, is a very fatal malady. The principal symptoms are horrible fœtor of the mouth, violent vomiting, great thirst, diarrhœa, and prostration. Usually the dog is said to have been poisoned. Frequent doses of bismuth and of chlorodyne may be tried, but the disease is mostly fatal.

Gastritis is frequently seen in dogs and cats; the principal symptoms are vomiting, dullness, and loss of appetite. It is usually the result of errors in feeding, other causes being internal parasites, exposure to damp and cold, constipation, etc. The patient is usually very thirsty, but water should be restricted and barley water substituted. Allow him to starve for a couple of days, and give the citrate of potash mixture and bismuth powders. Scraped raw meat is the best food.

When **Constipation** is present, a enema of castor or olive oil should be given with an ordinary glass syringe. Pomeranians and some other long-haired dogs may get constipated through fæces matting the hair about the anus and forming large concretions obstructing the passage. Concretions must be clipped off and the parts well washed and oiled.

Anæmia (insufficient blood or blood badly constituted) is in dogs often associated with faulty digestive or assimilative processes or with dietetic errors — feeding with starchy foods exclusively, for instance, as a result of the prejudice that many people have against giving flesh, their natural food, to dogs. A change of food, fresh air and exercise, and a course of Parrish's syrup and codliver oil will soon put matters right.

Worms in dogs are of two main varieties—round worms and tape worms. The presence of a considerable number may give rise to no symptoms whatever, but again, at times, they may produce vomiting, intestinal irritation, and nervous derangements. The patient should be starved for twelve hours and then receive twenty to thirty grams of powdered areca nut, and, a few hours after, a dose of castor oil and syrup of buckthorn.

Eczema is of very frequent occurrence in dogs; bad feeding and want of exercise are mostly the causes, but heredity and constitutional taint may be to blame. No breed is exempt, but Aberdeen terriers are perhaps more frequently attacked and are more difficult to cure than other breeds. Eczema occurs in two forms—acute and chronic. Acute eczema is happily not common. In it there is acute inflammation, involving the whole thickness of the skin, so that in severe cases a patch, sometimes as large as the palm of the hand, may die and slough off, leaving a raw surface, the animal meanwhile suffering intense pain. In the chronic, or usual form, the inflammation affects only the more superficial portion of the true skin. This gives rise to a slight discharge or moisture; on the surface, papules or vesicles form, which burst and, their contents drying, produce crusts. The hair falls and the skin is red and sore. Usually there is a good deal of scratching and rubbing, though in some cases of chronic eczema these symptoms may not be pronounced. For the acute form carbolic oil should be applied; for the chronic form sulphur ointment, paraffin and linseed oil equal parts, or sulphur and lime-water may be used.

Mange, of which there are two forms—sarcoptic and follicular—are both due to parasites which invade the true skin and have an effect like eczema. They can sometimes only be differentiated by microscopic examination. Both forms may be cured by frequent application of the old-fashioned lotion—oil of tar, sulphur, turpentine and linseed oil.

Canker of the ear is perhaps the most painful malady to which dogs and cats are subject. Flap-eared dogs, spaniels, etc., are very prone to it, though the disease is seen in all breeds. Canker is an inflammation of the fine skin that lines the flap and the ear passage. Though often due to parasites (*Acari*), it is seen complicating eczema of the head. The patient holds the head low and to one side, the affected ear towards the ground, and shakes the head violently. Occasionally a plaintive cry is uttered. The inside of the ear is red, and discharges a fetid material. Little ulcerating points may be observed, or, if the disease is of long duration, even extensive ulcers. Canker is very rebellious to treatment. The best treatment is to pour into the ear once a day twenty drops of a solution consisting of glycerine one ounce, Goulard's extract one dram. The ear must not be washed.

As to **feeding**, dogs are carnivorous animals, and must have flesh as part of their ration. It is better to feed twice a day than only once. Biscuits, porridge, rice or other starchy foods may be given for the morning meal, and meat and greens of some sort in the evening. If plenty of milk is available the meat may be dispensed with for young dogs. Fish also may be substituted for meat. Puppies of the toy breeds are usually given stale sponge cake, alone, or soaked in milk, in addition to a little meat.

APPENDICES

A

Refer to page 54.

LIVE STOCK SOCIETIES, PEDIGREE RECORDS, ETC.

AGRICULTURAL SOCIETIES.

American Breeders' Association (1903).—*Sec.*, c/o Agricultural Department, Washington, D.C., U.S. America.

Bath and West and Southern Counties Society (1777).—F. H. Storr, 3 Pierrepont Street, Bath.

British Dairy Farmers' Association (1876).—B. Ravencroft, 28 Russell Square, London, W.C.1.

Central Chamber of Agriculture.—Sir Herbert Matthews, 28 Westminster Palace Gardens, London, W.3.

Farmers' Club (1843).—C. Bertram Rolfe, 2 Whitehall Court, S.W.1.

Highland and Agricultural Society of Scotland (first form, 1784).—John Stirton, 3 George IV. Bridge, Edinburgh.

International Horse Association of Great Britain (1922).—*Sec.*, 12 Hanover Square, London, W.

National Farmers' Union.—*Sec.*, Arthur Denby Allen, 45 Bedford Square, London, W.C.1.

Royal Agricultural Society of England (1838).—Thomas B. Turner, 16 Bedford Square, London.

Royal Counties Agricultural Society (1861).—E. S. W. Dale, Land Agent, Basingstoke.

Royal Dublin Society.—Agricultural Superintendent at Leinster House, Dublin—*Director*, Edward Bohane.

Smithfield Club (*Incorporated*).—*Sec.*, E. J. Powell, 12 Hanover Square, London, W.1.

LIVE STOCK SOCIETIES.

Cattle.

National Cattle Breeders' Association.—*Sec.*, W. W. Chapman, 4 Mowbray House, Norfolk Street, Strand, London, W.C.2.

Aberdeen-Angus Cattle Society.—*Sec.*, James R. Barclay, 137 Union Street, Aberdeen.

Aberdeen-Angus Cattle Association (*English*). — *Hon. Sec.*, G. G. Macdonald, Manor House, Apethorpe, Peterboro.

Aberdeen-Angus Association (*Irish*).—*Sec.*, George Clark, 52 Richmond Road, Dublin.

Ayrshire Cattle Herd Book Society of Great Britain and Ireland.—Sec., Hugh Bone, 58 Alloway Street, Ayr.

Blue Albion Herd Book.—Sec., W. J. Clark, Alport, Bakewell, Derbyshire.

British Friesian Cattle Society.—Sec., George Hobson, 4 Southampton Row, London, W.C.1.

British Friesian Cattle Club (*West of Scotland*).—*Sec.*, W. G. Macdougall, 94 High Street, Paisley.

Dairy Shorthorn Association.—Sec., H. J. Tilly, 16 Bedford Sq., W.C. 1.

Devon Cattle Breeders' Society.—Sec., John Risdon, Wiveliscombe, Somerset.

Galloway Cattle Society.—Sec., J. Carlyle, Monraive, Middlebie, Lockerbie, Dumfriesshire.

Galloway (*Dun and Belted Cattle Breeders' Association*) (founded 1921).—*Sec.*, Wm. M'Connel, Solicitor, Gatehouse.

Gloucestershire Cattle Society.—Sec. (assistant), C. N. Smith, *Chronicle* Office, Gloucester.

Guernsey Cattle Society (*English*).—*Sec.*, Robert F. Ling, 12 Hanover Square, London, W.1.

Guernsey Royal Agricultural and Horticultural Society of Guernsey.—Sec., Henry Carré, States Arcade, Guernsey.

Hereford Herd Book Society.—Sec., W. G. C. Britten, 3 Offa Street, Hereford.

Highland Cattle Society of Scotland.—Sec., Duncan MacGregor, Clydesdale Bank, Oban.

Jersey Cattle Society (*English*).—*Secs.*, T. W. Hammond and L. J. Craufurd, 19 Bloomsbury Square, London, W.C.1.

Jersey Herd Book.—Sec., H. G. Shepard, 3 Mulcaster Street, St Helier, Jersey.

Kerry Cattle Society of Ireland.—Hon. Sec. and Treasurer, B. Fitzsimon, 21 Newbridge Avenue, Sandymount, Dublin.

Kerry and Dexter Cattle Society (*English*).—*Secs.*, T. W. Hammond and L. J. Craufurd, 19 Bloomsbury Square, London, W.C.1.

Lincolnshire Red Shorthorn Association.—Sec., Robert Lamming, St Benedict's Square, Lincoln.

Longhorn Cattle Society.—Hon. Sec., R. S. Walters, Bingley Hall, Birmingham.

Maoline Cattle Society.—Hon. Sec., P. J. Geoghegan, Dublin.

Park Cattle Society.—Sec., E. R. Sandwith, The Studio, North Holmwood, Dorking.

Red Poll Society of Great Britain and Ireland.—Sec., C. H. Clarke, 24 Warrington Road, Ipswich.

Shetland Cattle Herd Book Society.—Hon. Sec., W. Laidlaw M'Dougall, Sumburgh, Shetland, N.B.

Shorthorn Association (*Cumberland and Westmorland Dual-Purpose*).—*Sec.*, Geo. M. Bell, 1 Lonsdale Street, Carlisle.

Shorthorn Breeders' Association (*Irish*).—*Sec.*, Thos. J. Hayes, Lynmere, Blackrock, Co. Dublin.

Shorthorn Breeders' Scottish Joint Committee.—*Sec.*, Wm. Mackay, 377 High Street, Edinburgh.

Shorthorn Breeders' Association (*Mid-Ulster*).—*Hon. Sec.*, Wm. Parker, Union Street, Cookstown, Tyrone.

Shorthorn Society of Great Britain and Ireland.—*Sec.*, V. H. Seymour, 12 Hanover Square, London, W.1.

South Devon Herd Book Society.—*Sec.*, W. Napier Smith, 6 Princess Square, Plymouth.

Sussex Herd Book Society.—*Sec.*, A. G. Holland, 12 Hanover Sq., W.1.

Welsh Black Cattle Society.—*Secs.*, J. Pritchard & Co., Bangor, N. Wales.

Swine.

National Council of Pig Breeders and Pig Feeders (*Incorporated*).—*Sec.*, Alec Hobson, 92 Gower Street, London, W.C.1.

National Pig Breeders' Association (*Large White, Middle White, and Tamworth Pigs*).—*Sec.*, Alec Hobson, 92 Gower Street, London, W.C.1.

Berkshire Society (*British*).—*Hon. Sec.*, A. W. Hewett, Imperial House, 27 Cavendish Square, London, W.1.; *Herd Book Sec.*, Edgar Humfrey, 50 Park Road, Abingdon, Berks.

Cumberland Pig Breeders' Association.—*Sec.*, George M. Bell, 1 Lonsdale Street, Carlisle.

Essex Pig Society.—*Sec.*, A. F. White, 17 Duke Street, Chelmsford.

Gloucester Old Spots Pig Society.—*Secs.*, Tribe, Clarke & Co., Albion Chambers, Bristol.

Large Black Pig Society.—*Sec.*, W. J. Wickison, 12 Hanover Square, London, W.1.

Large White Ulster Pig Society.—*Hon. Sec.*, Kenneth MacRae, Balmoral, Belfast.

Lincolnshire Curly Coated Pig Breeders' Association.—*Sec.*, R. Dixon, The Hollies, Dorrington, Lincoln.

Long White Lop-Eared Pig Society.—*Sec.*, W. P. Newton, Church View, Whitchurch, Tavistock, Devon.

North Wales and Cheshire Pedigree Pig Breeders' Association.—*Sec.*, John Pritchard & Co. (Parker Mackenzie, F.A.I.), Bangor.

Royal Dublin Society's Register of Pigs.—Editor, at Leinster House, Dublin.

Scottish National Association of Pig Breeders.—*Sec.*, W. S. Brown, C.A., 45 Queen Street, Edinburgh.

Welsh Pig Society (which includes *The Old Glamorgan Pig Society*, established 1918: *The Welsh Pig Society*, established in W. Wales, 1920: amalgamated 1922).—*Sec.*, J. Thomas, Milk Recording Officer, Shire Hall, Carmarthen.

Wessex Saddleback Pig Society.—*Sec.*, J. M. M'Carthy, 32 Market Place, Salisbury.

Horses.

Arab Horse Society.—*Sec.*, Rev. D. B. Montefiore, 15 Wyndham Street, Brighton.

Association for the Improvement of the Breed of New Forest Ponies.—*Hon. Sec.*, T. Stovold, Harrow Farm, Bransgore, Christchurch, Hants.

Association of Light Horse Exhibitors.—Sec., F. Slatterey, 12 Clarges Street, W.1.

Association of Show Jumpers.—Hon. Sec., Major V. D. S. Williams, Green Norton Court, Towcester.

Black Mountain and District Welsh Pony and Cob Improvement Society. —J. Edgar Herbert, Brynamman, Carmarthenshire.

British Trotting and Galloway Stud Book.—Sec., William J. Clark, Alport, Bakewell.

Cleveland Bay Horse Society of Great Britain and Ireland.—Sec., J. Fairfax Blakeborough, M.C., Grove House, Norton, Stockton-on-Tees.

Clydesdale Horse Society of Great Britain and Ireland.—Sec., Arch. MacNeilage, 93 Hope Street, Glasgow.

Dales Pony Improvement Society.—Hon. Sec., W. Patterson, 5 Cattle Market, Hexham-on-Tyne.

Exmoor Pony Society.—Sec., Reg. V. Le Bas, Dulverton.

Fell Pony Society.—Captain A. W. Wingate, Lowther, Penrith.

Galloway Pony Society.—Sec., D. Y. Veitch, Low Creoch, Gatehouse.

General Stud Book Thoroughbreds.—Weatherby & Sons, 15 Cavendish Square, London, W.1.

Hackney Horse Society.—Sec., Robert F. Ling, 12 Hanover Sq., W.1.

Hunters' Improvement and National Light Horse Breeding Society.—Sec., A. B. Charlton, 12 Hanover Square, London, W.1.

International Horse Shows, Ltd.—Sec., 12 Hanover Sq., London, W.1.

Joint Parliamentary Committee of Horse Breeding Societies.—Sec., A. B. Charlton, 12 Hanover Square, London, W.1.

London Cart Horse Parade Society.—Sec., R. A. Brown, 12 Hanover Square, London, W.1.

London Van Horse Parade Society.—Sec., R. A. Brown, 12 Hanover Square, London, W1.

National Horse Association of Great Britain (formed 1922).—*Sec. pro tem.*, A. B. Charlton, 12 Hanover Square, London, W.1.

National Pony Society.—Sec., F. H. Badge, 12 Hanover Square, W.1.

National Trotting Horse Breeders' Association, Ltd.—Sec., Clock House Chambers, Barking, Essex.

Percheron Horse Society (British).—Hon. Sec., A. W. Hewett, Imperial House, 27 Cavendish Square, London, W.1.

Shetland Pony Stud Book Society.—Sec., R. W. Walker, 3 Golden Square, Aberdeen.

Shire Horse Society.—Sec., A. B. Charlton, 12 Hanover Square, W.1.

Suffolk Horse Society.—Sec., Fred. Smith, Woodbridge, Suffolk.

Thoroughbred Breeders' Association.—Sec., Edward Moorhouse, 26 Charing Cross Road, London, W.C.2.

Welsh Pony and Cob Society.—Sec., J. R. Bache, Knighton, Radnor.

Yorkshire Coach Horse Society.—Sec., F. Walker, 3 Blake Street, York.

Sheep.

National Sheep Breeders' Association.—Sec., W. W. Chapman, 4 Mowbray House, Norfolk Street, Strand, London, W.C.2.

Blackface Sheep Breeders' Association.—Sec., J. P. Mitchell, Comrie, N.B.

Blackface Sheep Breeders' Society (English).—Sec., J. Brannen, Viewlands, Hexham.

Border Leicester Sheep Breeders (Society of).—Sec., Miss Rose J. E. Grant, 11 St Ronan's Terrace, Edinburgh.

Cheviot Sheep Society.—Sec., John Robson, Newton Bellingham, Northumberland.

Cotswold Sheep Society.—Sec., James W. Tayler, Cold Aston, Bourton-on-the-Water, Glos.

Dartmoor Sheep Breeders' and Flock Book Association.—Sec., S. A. Yeo, 3 West Street, Okehampton.

Derbyshire Gritstone Flock Book.—Sec., William J. Clark, Alport, Bakewell.

Devon Long-wool Sheep Breeders' Society.—Sec., A. E. Gerrard, Wiveliscombe, Somerset.

Dorset Down Sheep Breeders' Association.—Sec., E. B. Duke, 47 South Street, Dorchester.

Dorset Horn Sheep Breeders' Association.—Sec., T. H. Ensor, F.H.A.S., F.A.I., Bank Chambers, Dorchester, Dorset.

Exmoor Horn Sheep Breeders' Society.—Sec., D. T. Tapp, Highercombe, Dulverton, Somerset.

Hampshire Down Sheep Breeders' Association.—Sec., W. J. Wooff, 49 Canal, Salisbury.

Herdwick Sheep Breeders' Association.—Sec., W. Wilson, Watendlath, Keswick, Cumberland.

Kent or Romney Marsh Sheep Breeders' Association.—Sec., W. A. Ball, 12 Hanover Square, London, W.1.

Kerry Hill (Wales) Sheep Breeders' Association and Flock Book Society.—Secs., Morris, Marshall, and Poole, Newtown, Montgomery.

Leicester Sheep Breeders' Association.—Sec., W. A. Brown, Elms Villa, Driffield, E. Yorkshire.

Lincoln Long-wool Sheep Breeders' Association.—Sec., Robert Lamming, St Benedict's Square, Lincoln.

Lonk Sheep Breeders' Association and Flock Book Society.—Sec., Wm. Pate, Shuttleworth Pasture, Briercliffe, N. Burnley.

Oxford Down Sheep Breeders' Association.—Sec., Howard Sammons, Summerhayes, Christchurch Road, Sidcup, Kent.

Roscommon Sheep Breeders' Association.—Sec., W. Shaw Acheson, Rushill, Hill Street, Drumsna, County Roscommon.

Ryeland Sheep Breeders' Association and Flock Book Society.—Sec., W. H. Woodcock, St Cuthbert's, Whitecross Road, Hereford.

Shropshire Sheep Breeders' Association.—Secs., Alfred Mansell & Co., College Hill, Shrewsbury.

South Devon Flock Book Assoc.—Sec., J. Todd, 30 Fore Street, Totnes.

Southdown Sheep Society.—Hon. Sec., W. O. Stride, 63 East Street, Chichester.

Suffolk Sheep Society.—Sec., Miss E. M. Prentice, 25 Marlborough Road, Ipswich.

Swaledale Dales-Bred Sheep Breeders' Association.—Sec., W. Rees, Solicitor, Kirkby Stephen.

Welsh Mountain Sheep Flock Book Society.—Sec., Robert Roberts, Rhydygarnedd, Towyn.

Wensleydale Sheep Breeders' Association.—Sec., G. G. Robinson, Underley Farm, Kirkby Lonsdale.

Goats.

British Goat Society.—Hon. Sec., Thos. W. Palmer, 5 Fenchurch Street, London, E.C.3.

Affiliated Goat Societies, see p. 778.

Dogs.

International Sheep Dog Trials Society.—Hon. Sec., J. A. Reid, Solicitor, Airdrie.

The Kennel Club.—Sec., H. T. W. Bowell, 84 Piccadilly, London. W. 1.

Collie Club (1881).—*Hon. Sec.*, Wm. W. Stansfield, Laund House, Rawtrenstall, Lancs.

Scottish Shetland Sheep-dog Club.—Sec., D. MacGregor, 12 Ashley Place, Bonnington, Edinburgh.

Scottish Kennel Club.—Sec., D. E. Wallace, C.A., 37 Melville Street, Edinburgh.

English Shetland Sheep-dog Club.—Sec., Miss Grey, The Wilderness, Bowsey Hill, Henley-on-Thames.

Southern Old English Sheep-dog Club.—Sec., H. Knapp, 10 Broadway Avenue, St Margaret's, Twickenham.

B

REFRIGERATION IN DAIRY DEVELOPMENT.[1]

As in 1921 (for example) we imported 140,213 tons of butter and 135,064 of cheese (the sources of supply being Australia, Canada, New Zealand, South Africa, Argentina, Denmark, France, Holland, Norway, Russia, Sweden, etc.), the question naturally arises, "Could we not, with advantage, increase the home production of these articles?"

There are four divisions of dairy practice in Great Britain:—(1) The supply of milk for domestic use; (2) butter making; (3) cheese making; (4) the drying of milk into powder.

The domestic milk supply is by far the largest and most important branch. The control of it has, to a certain extent, been taken over by the Ministry of Health, and in Scotland, England, and Wales many places have been licensed to sell what is defined as—"Grade A (certified) milk," and "Grade A milk." The rules issued by the Ministry relate chiefly to cleanliness, and to the prevention of the bacterial decomposition of the milk. This decomposition is first indicated by the milk going "sour," either quickly or slowly, according to the external temperature; and there is only one satisfactory way of checking it, viz., by cooling the milk to 38° F. as it leaves the cow.

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[1] With acknowledgments to Loudon MacQueen Douglas, F.R.S.E., Savile Terrace, Edinburgh.

But while low temperatures check, they do not destroy the bacteria. And so **pasteurisation**, *i.e.*, the destruction of pathogenic and other injurious germs by heating the milk, either for a prolonged period at a temperature of 140° F., or quickly, at a temperature of 160°-170° F. has assumed an important place in dairying, in connection with the domestic milk supply.

The lower temperature is preferable, as neither enzymes nor vitamines are affected, and the prolonged heating is equivalent to rapid heating at high temperatures. In either case, the milk is first cleaned by means of a milk cleaner, which, in design, is really a low speed separator; and then it is raised to about 95° F. by passing it over a flat capillary heater, and floating organisms are eliminated without separating the cream.

The milk passed through the pasteuriser flows through the retarder, which keeps it at a steady temperature for some twenty minutes.

After heating, the milk is passed over a cooler (circular or flat) with a capillary surface (Plate CCXXX. B). If a flat compound cooler be used (Plate CCXXIX. B), the upper portion is utilised for the circulation of ordinary (town or well) water. The descending milk passes over the capillary surface of the lower part cooled by a circulation of brine from the refrigerating machine, and is then ready for domestic use. Where refrigerating machinery is not available, ice may be used.

Butter Making in the creamery may be carried on in places remote from large centres of population, and this secures a speedy cash return.

A Creamery should consist of four different sections or departments:—(*a*) a receiving platform with tank (Plates LXXXII., LXXXIII., and LXXXIV.) from which a pipe is led to (*b*) the separator room; (*c*) a boiler and engine-room where steam is generated and power produced; and (*d*) a delivery shed, where the separated milk is weighed out.

This arrangement is capable of many variations. Perfect drainage, hygienic surroundings, and a plentiful water supply are indispensable. The creamery should have a road round the building, so that carts from the receiving platform may proceed to the separated milk delivery shed without obstruction.

The **Mechanical Equipment** shown on the accompanying plates consists of:—(1) boiler and engine (separate or combined); (2) milk receiving tank; (3) pasteuriser; (4) separator or separators; (5) circular, conical, or flat cream coolers; (6) pasteuriser for separated milk; (7) circular conical coolers (two) for separated milk; (8) separated milk tanks; (9) cold water store tank; (10) cream ripening vats; (11) refrigerating machine; (12) circular capillary conical cooler for cooling cream, or refrigerated ripening vats; (13) churn; (14) butter worker, or combined churn and butter worker; (15) chilled water tank; (16) cold store; (17) pump for raising cream to ripening vats; (18) centrifugal tester for milk (with a stock of bottles); (19) pails, brushes, "Scotch hands," and general accessories.

The size of the various appliances is regulated by the quantity of milk to be handled. Up to 500 gallons a day, one separator is required; for 1000 gallons, two or more.

A **sample** from each churn is placed in a bottle, numbered for identification purposes; put with small pellets of chloride of mercury, which does not affect the butter-fat, the contents will keep perfectly sweet for several days.

The milk, tipped into a general receiving tank, travels to the heater, and is raised to a temperature of about 120° F. before passing to the separators. Separated cream generally contains about ·30 per cent. of butter-fat. It must be cooled at once to about 55° F. for a ripening period of forty hours, but for a ripening period of from sixteen to seventeen hours to 65° to 70°, controlling and lowering the temperature as the ripening proceeds.

In the sixteen to seventeen hours' process, the cream, left over night in the ripening vats at about 60° F., will have increased next morning to from 65° F. to 68° F. To obtain a finished churn temperature of 52° to 54° F., the temperature is reduced to 46° F. in summer and 54° F. in winter in refrigerated cream ripening vats. Ice may be used in the process.

The separated milk is cooled to about 70° F. by means of a very large capillary cooler through which water circulates. Previous to cooling, it is well to increase the temperature to about 180° F. to destroy pathogenic and other germs.

In **Cheese Making**, refrigeration is revolutionising the practice. The *Journal of the Board of Agriculture*, vol. xiii., p. 426, details the cold curing of cheese as carried out in America and Canada since 1895. At temperatures round 40° to 50° F., newly-made cheese can be mild-cured under the influence of galactase—an enzyme natural to milk, which has the power of breaking down casein. Although the time taken is a week longer than under the heated air method, there is greater uniformity, characteristic flavour, and a great saving in weight.

The **Physical Principles** involved in **Refrigeration** are as follows:—"When a solid body is converted into a liquid, or a liquid into a gas or vapour, the change is accomplished by the absorption of heat. While the change is going on, the temperature of the body does not rise, and the heat absorbed, being insensible to the thermometer, is called "latent heat." If we apply heat, for example, to a block of ice, the temperature does not rise above the freezing-point —32° F.—until every particle of ice has become liquid, and, similarly, when water is heated to the boiling-point, the temperature remains at 212° F. until all the water has been turned into steam. The same law applies to liquefied carbonic anhydride, ammonia, and sulphurous anhydride, the substances chiefly used in refrigerating machines. Only, these liquids are so extremely volatile that the change of state takes place with great rapidity, and heat is absorbed correspondingly. Very low temperatures are obtained by simply evaporating any of these liquids in the open air. But if we place one of them in a confined place, say a wrought-iron coil, and attach a pump to it, the suction of the pump produces a partial vacuum, which accelerates the speed of evaporation, and the absorption of latent heat goes on faster than ever. The necessary heat is drawn from the coil and from surrounding materials, and, if the coil be placed in the atmosphere of an insulated room, heat is rapidly withdrawn from the air and its solid contents; or, on the other hand, if the coil be immersed in a tank of unfreezable brine, the temperature of the latter is reduced below the freezing-point, and if it be pumped through a series of pipes or drums in the insulated room, it will reduce the temperature of the latter and their contents to any desired extent. The volatile liquids are valuable and must not be thrown away, and attention is therefore transferred to the other, or pressure end of the pump, where a reverse action takes place. When gases are compressed they diminish in volume, and their latent heat is given up and becomes sensible heat, which can be measured by the thermometer: and if this heat be removed by a cooling medium, such as cold water, the gases become liquid again, and if the ends of the two coils not connected to the pump are joined together, the liquid formed in the compression coil can be transferred to the suction or evaporator coil, and used over again, and so on *ad infinitum*. One charge of carbonic anhydride, ammonia, or sulphurous anhydride would be sufficient for all time, if we were able to produce machinery entirely free from leakages."

The **Modern Refrigerating Machine** is constructed on the lines indicated. It consists of a pump specially constructed to deal with the particular refrigerant used, and two coils, or sets of coils of iron pipe, in one of which "cold" is produced by the evaporation of one of the volatile liquids, assisted by the suction of the pump; in the other the gas produced by evaporation is again liquefied by combined pressure and cooling by means of water, and the liquid is transferred to the evaporator coil for service again. It is important to know that if the liquid be allowed to flow back freely to the evaporator coil, very little refrigeration is effected. A regulator valve introduced on the transfer pipe must be adjusted with the utmost care so that the flow of liquid shall not exceed the maximum which can be evaporated in the suction coil.

The **Air Cooler** applied to cold stores is not available for cooling capillary coolers; but it lends itself to use in cheese factories. The evaporation of the refrigerant takes place in coils over which a current of air from the chamber or chambers is carried by means of a fan, and in the passage the heat is absorbed by the refrigerating gas expanding in the coils.

Cooling effects are required in both the farm and the town dairy, as well as in the creamery and cheese factory, and the fact that they can be obtained at comparatively small cost, has caused a great extension in the use of refrigerating machinery.

Cold rooms, cooled from the refrigerating machine, require to be specially insulated, and constructed so as to be easily washed out and kept clean and sweet. They are used for the storage of cooled milk and of cream and butter.

C

(*a*) DRYING OF MILK, ETC.

The **Just-Hatmaker process** of drying milk has solved the difficulty of what to do with separated milk at creameries, or with large quantities of full milk for which there is not a remunerative outlet. Although much inferior, unattractive, and even unwholesome milk-powder has found its way into the market from the milk-drying machine illustrated on Plates CCXXXI. and CCXXXII., as a result of unskilled or careless management, there is no doubt that by judicious and expert handling, milk can now be relieved of all but about 6 per cent. of its moisture without appreciably altering, or in any way injuring, the milk residue as food even for infants. It has been thoroughly tested, chemically and bacteriologically, at the Carnegie Laboratories, and under the supervision of the Officers of the Board of Health of New York. It has been shown to be "absolutely sterile and indefinitely preservable." In the stomach it coagulates into small, easily assimilated, granular particles like human milk, and is not liable to form large indigestible clots like ordinary cows' milk. The mechanism is quite simple. "Two polished metal cylinders, 28 inches in diameter by 5 feet long, are mounted parallel in a solid framework, and separated from each other about an eighth of an inch. They revolve inversely, making six to eighteen turns per minute. Above them is placed a small box for holding the milk, in contact with a main reservoir, which feeds each box through a supply pipe. Steam, from the boiler of the engine producing the driving power, and at a pressure of three atmospheres, is introduced into the cylinders, the surfaces of which are thereby heated to a temperature of between 220° × 230° F. The liquid milk to be dried is allowed to fall in thin streams upon the heated revolving cylinders, and its water is rapidly evaporated." Each cylinder becomes covered with a thin layer of milk solids in a soft condition, which is removed by two fixed knives or scrapers nicely adjusted in close proximity to the surfaces of the revolving cylinders. The work is facilitated by a pad of steam which forms between the surfaces of the cylinders and the milk, and thus prevents it being scorched at the high temperature, at which, but for this mechanical protection, milk would readily assume a burnt flavour and odour. The heat of the subjacent rollers almost instantaneously dries the soft film or continuous sheet to a solid state, and it subsequently falls, in a brittle condition, into the receiving box. On being put through a sieve to reduce it to a uniform powder resembling a coarse flour, it is ready to be made up in moisture-proof tins or bags for transport to market. It is only one-eighth the weight of liquid milk, and it can be immediately restored to the liquid condition by the addition of hot water at about 170° F. For cooking purposes it is most serviceable, being always at hand without risk of acidity. In all the industries in which milk is used it has proved successful; for example, for bakers, biscuit-makers, confectioners, chocolate-makers, restaurants, etc. The greatest demand for it has been for baby food products such as "Glaxo," which is greatly in demand to-day, and also chocolate making; but its general introduction is merely a matter of time, as it is a pure product of the farm in a most convenient form. It will also prove an immense boon to long-voyage ships at sea, and to armies in the field. The success of the Just-Hatmaker process, especially in conjunction with the success of the milking machine, has put under requisition for milk-supply purposes vast tracts of land in Australasia and New Zealand, South Africa, South America, and British India, which may thus enter into direct competition with the dairy industry of this country.

The **Macintyre & Milne Patent Drying Machine**, as accompanying figure shows, is a great improvement on the Just-Hatmaker patent, increasing the output by 50 per cent. It is made by James Milne & Son, Ltd., Milton House Works, Edinburgh. The material to be dried is deposited on the rotating cylinders at multiple points by means of small auxiliary rollers. It is filmed on the drying cylinder (DD) at the points (BB). The film is thickened at C by a further supply of material; in some cases this supply is scraped off the auxiliary rollers by scrapers (EE). This machine has been exported to France, Belgium, Italy, Russia, New Zealand, South America, Holland, Canada, Germany, and Austria.

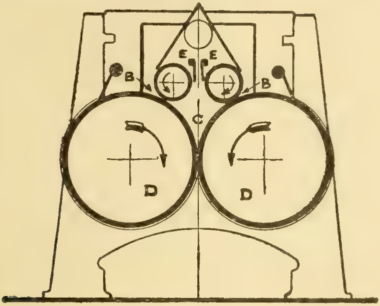

FIG. 102.

Vacuum Drying Machines of single or twin cylinder type may be used for the drying of alkaline and neutral lyes of chemical works, sulphate of zinc, nitrates of ammonia and calcium, chlorides of barium and sodium, cyanide, milk, eggs, blood serum, etc.; salt solutions, glue, tannin extract, dyes, colours, etc.; yeast, malt and sugar extracts. The heating medium may be steam, oil, or gas.

Successful drying depends chiefly on the method of application of the material to the machine, different material necessitating different forms of application. It is also greatly affected by the quality of the metal of the drying cylinders, which are made of a special mixture, and have been in great demand both in this country and on the Continent.

The machine consists of an **outer casing** of cast iron or mild steel, sometimes tinned or coppered inside to suit special working conditions. Inside this casing revolves the drying cylinder made of cast iron or gun metal, turned, ground, and highly polished, and heated internally. The cylinder rotates at a speed of 1 to 10 revolutions per minute, according to the material which is being dried, the temperature of steam available and the thickness of film required. The casing sits on three cast-iron boxes, one of which, the solution box, runs the whole length of the machine and contains the material to be dried; the other two are the receiving boxes for the dried product. These receiving boxes are sometimes arranged to accommodate barrels run in on trolleys. The dipping trough is in the lower part of the vacuum casing, and the solution in it is kept at a constant level by means of an overflow which leads back to the solution tank. A pump is provided for maintaining the supply of solution in the dipping trough. Provision is being made for raising or lowering the level of material in the dipping trough: a thick or thin film can be picked up by the drying cylinder. The dried product is taken off as a flake or powder, and milling or reeling is unnecessary. It is scraped off the cylinder by a steel blade, adjustable by means of handwheels on the outside of the vacuum casing. A conveyor band or worm delivers it to a receiving box at either end of machine, so that when one box is filling the other can be emptied without stopping the machine or breaking the vacuum. If solvents such as alcohol, ether, acetone, etc., are present in the material, they are carried off with the steam and can be reclaimed. Any dust carried off with the steam is intercepted by means of a special filter. Observation glasses are arranged on the vacuum case and receiving boxes, so that the operation of the machine can be noted. Suitable lifting and running gear is provided for the quick removal of the drying cylinder.

For drying nearly all liquids the single cylinder machine, which in some cases is fitted with a filming roll intermediate between the dipping trough and cylinder, is recommended. Pastes, also liquids which crystallise readily or froth much, are generally more conveniently dried on the twin cylinder machine.

The **advantages of vacuum drying** are:—Lower temperature of heating medium, the evaporation taking place at about 100° F. in place of 212°; large output due to rapid evaporation; volatile substances carried off in the vapour are not lost; absolute freedom from dust, as there is no contact with the atmosphere; materials sensitive to heat do not suffer in any way; the dried products retain their taste, aroma, colour, etc.

(*b*) THE ALFA-LAVAL CENTRIFUGAL CREAM SEPARATOR.

This ingenious invention of Dr Gustaf de Laval came from Sweden, and was exhibited for the first time in England at the R.A.S. Show at Kilburn in 1879. Within the period of forty odd years no implement in the dairy line has made greater progress in efficiency and in popularity. The working capacity of the power type has, for instance, been thrice nearly doubled: first, in 1890, by reducing the size of the formerly hollow revolving steel bowl, and nearly filling with a series of cone-shaped Alfa discs, by which the milk is divided into thin layers, and cream separation greatly accelerated; second, in 1900, by introducing the supply at that area of the revolving discs where the specific gravity of the milk is normal; and third, in 1907, by strengthening and detaching the spindle and raising the upper end of it, upon which the bowl rests, above the centre of gravity of the bowl when full of milk. This reduces the vibration so much that the saving in the driving power is enormous. The work of separation now begins at once, and is not retarded in its progress by either cream or separated milk coming in contact with the supply of incoming milk, as was formerly the case.

The Alfa-Laval separator is now manufactured in the following types, viz.: for hand power; for direct belt drive from a transmission shaft; for rope drive with intermediate; for steam turbine drive; and as turbine motor separator. The last-mentioned type is used in the s.c. Alfa-Laval turbine dairies, suitable for smaller dairies with milk quantities of 220 to 1100 gallons per day, and is characterised by the separator fulfilling the functions of both separator and steam engine. The skimming capacity of the various sizes ranges from 13 to 660 gallons per hour. The hand-power machines can also be fitted with special devices for electric or transmission drive. The Alfa-Laval of to-day is capable of separating the cream from the milk at any temperature, while the cream can be regulated to any thickness at any temperature.

The percentage of fat left in the milk is only .03 to .08 per cent. Professor Stokes, Public Analyst, Paddington, reported on a sample of milk separated by an Alfa-Laval machine as follows: "It contains only one-fourth of the amount of butter-fat usually left in by separators. It is the smallest amount of butter-fat I have yet found in a separated milk."

The Alfa-Laval separator when separating cream from milk, at the same time also removes impurities and disease germs which are held by the slime which settles inside the bowl. In order to make the most of this quality of the separator, the Alfa-Laval Company in 1911 designed a special *Milk Clarifier*, which is now in use wherever there is an imperative call for pure milk. The milk clarifier is built in three sizes, viz., for 200, 330, and 880 gallons per hour. The clarifier only removes the impurities from the milk, without in any way separating the cream from the milk, and consequently the nature and quality of the milk remain unchanged.

If milk consumers who are afraid of the germs of tuberculosis or other pathogenic germs were to realise this fact, the success of the Alfa-Laval milk clarifiers would be even greater than it is.

Over 200,000 Alfa-Laval separators had been sold by 1900, 1,000,000 by 1910, and 2,500,000 by 1920; the machine has been awarded upwards of 1100 highest prizes.

D

Refer to page 25.

SKELETONS—ANCIENT AND MODERN.

	Length of Head.	Between Horns.	Height at Withers as Mounted.
BOS PRIMIGENIUS = URUS.			
First skeleton mounted in England; Science School, Cambridge. Probably ♀. From Burwell Fen, Cambs.	2′ 1″	8¼″	5′ 3″. Allow fully 3″ for hide and "fluff" on withers and 1″ for thickness of frog = 5′ 7″, or 16¾ hands.
Complete skeleton mounted, at Lund, Sweden, with scar of flint arrow on vertebra.	2′ 3⅞″	8½″	5′ 7½″. Allow 4″ as above, = 5′ 11½″, or 17 hands, 3½″.
Imperfect skeleton at Lund . .	2′ 5″	...	...
Another skull at Lund . . .	2′ 4½″	10″	...
MODERN CHILLINGHAM PARK CATTLE.			
Mounted skeleton in Oxford University Museum. ♂ Shot 20.10.73.	1′ 5¼″	4¾″	c. 12½ hands.
Stuffed in British Museum (S. Kensington). ♂ Measured 27.2.78.	...	...	c. 4′ 2½″ = 12 hands, 2½″.
Chillingham Cow from Zoo. Gardens. See page 804. No. 33.	1′ 4⅝″	...	...
Chartley Cow, *Herd Book*, No. 84.	1′ 5⅛″	...	...

A skeleton of *Bison priscus*, mounted, at Lund, measures 5′ 7″ at withers.

The following six skulls of *Bos primigenius* in the British Museum, S. Kensington, were very kindly measured for me by Dr C. W. Andrews, D.Sc., F.R.S. They are here arranged in order of length of face, the most important (single) measurement, though it does not necessarily indicate the comparative size of the individual. Taking all the measurements collectively, the order of size of these six animals appears to be:—Ilford, Atholl, Preston, Chingford, Twickenham, Kirkcudbright. The Atholl example, selected by the late Professor Owen as the type of the species, and very accurately figured in his *British Fossil Mammals* (p. 498), is (so far as my knowledge goes) abnormal, and perhaps suggests accidental castration while young.

Typical horns of the *Urus* originate from the skull in a diagonal direction, that is, they start sideways (to the long axis of the skull), but with a decided backwards inclination; almost immediately, however, as if they had discovered their error in direction, they sweep round, and describe a wide crescent with concave side to the front, and the tips bend very slightly upwards, and a little inwards, so that the tips are not the parts of the horns which are furthest from each other. In the Atholl example, after the normal start outwards and backwards, they proceed almost directly outwards with only a very slight bow until, some few inches from the tips, they turn up, the tips being bent upwards and backwards, and form the parts of the horns which are furthest from one another; each core almost forming a shallow S [= S].

	Length of face, Occipital ridge to end of premaxilla.	Width between bases of horns in front.	Least width of forehead (between horn-cores and orbits.	Width at posterior border of orbits.	Circumference of base of horn-core.	Length of horn-core on outside of curve.
Atholl	2′ 5¾″	1′ 1½″	10¼″	1′ ¾″	1′ 1¾″	2′ 4½″
Chingford .	2′ 4½″	0′ 9¾″	9½″	1′ ⅛″	1′ 3″	2′ 3¾″
Preston . .	2′ 4¼″	0′ 11¾″	10″	1′ ½″	1′ 3″	2′ 5½″
Ilford . .	2′ 4″	1′ 1″	10½″	1′ 1¼″	1′ 5″	2′ 9″
Twickenham .	2′ 3¾″	1′ 0″	9½″	1′ ¼″	1′ 2″	2′ 2½″
Kirkcudbright	2′ 3″	0′ 10″	8¾″	0′ 11⅛″	1′ 1½″	1′ 10½″

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E

Refer to page 121.

ADDITION TO THE "MOST PROMINENT BREEDERS" OF DEVON CATTLE (given on page 121).

G. C. Alexander, Manor House, Winterbourne Stoke, Salisbury; T. W. Burnell, Stitchpool, North Molton, Devon; J. W. Bussell, Town, Gittisham, Honiton, Devon; C. N. Cornish, Pixford, Combe Florey, Taunton, Somerset; A. J. Hill, Roadwater, Washford, Somerset; W. J. Huxtable, Marsh, Wrafton, Devon; W. B. T. Johns, Treringy, Crantock, Newquay, Cornwall; C. H. Jones, Water Farm, Stogursey, Bridgwater, Somerset; N. D. Lupton, Chalmington, Dorchester, Dorset; W. G. Bickham Morel, Timberscombe, Dunster, Somerset; Sir Felix Schuster, Bart., Verdley Place, Fernhurst, Sussex; F. Shearman, Stoodleigh Court, Tiverton, Devon; F. Stanbury, Ham Mill, Werrington, Launceston, Cornwall; Major O. L. Trechmann, Westaway, Barnstaple, Devon.

F

Refer to page 52.

(*a*) PARK CATTLE THAT HAVE BEEN EXHIBITED AT THE ZOOLOGICAL GARDENS, LONDON.

No.	Sex.	Date of Birth and Arrival.	Killed, Died, or Sent Away.
1	♂	Chartley, 1889; 25th June 1890	Died 21st Nov. 1893
2	♀	Vaynol, 1889-90; 3rd Nov. 1890	" 30th Dec. 1902
3	♂	Bred from above two; 1st May 1892	" 31st Oct. 1899
4	♂	Cross progeny; 16th June 1893[1]	" 8th June 1894
5	♀	" " 7th June 1894	" 9th Jan. 1896
6	♀	" " 3rd May 1895	—
7	♀	" " 23rd Aug. 1896	" 16th Feb. 1898
8	♂	" " 11th July 1897	" 7th June 1898
9	♂	" " 30th May 1898	Killed 15th May 1912
10	♀	" " 7th June 1899	" 10th Jan. 1901
11	♀	" " 30th Apl. 1900	" 16th Aug. 1910
12	♀	" " 8th Apl. 1901	" 3rd Mar. 1902
13	♀	" " 2nd Mar. 1902	" 30th Dec. 1902
14	♀	" " 18th Nov. 1902	" 12th June 1904
15	—	" " 1903	Still-born
—	—	[None 1904]	
16	♀	Cross progeny; 2nd Apl. 1905	Sold 4th Sept. 1905
17	♀	" " 25th May 1905	Killed 17th Apl. 1906
18	♂	" " 16th May 1906	Presented to the Duke of Bedford, 13th Sept. 1906
19	♂	" " 19th Apl. 1907	Exchanged 27th Nov. 1907
20	♂	" " 19th Mar. 1908[1]	Killed 12th Nov. 1912 (skull at Poynetts)
21	♀ ?	" " 2nd Feb. 1909	Killed 19th Nov. 1912 (skull at Poynetts)
22	♂	" " 14th Jan. 1910	Sold 8th Sept. 1910
23	♂	" " 24th May 1910[1]	Sent to Calcutta Zoo, 2nd Feb. 1913
24	♀	Bred in Hants by Lord Arthur Cecil; 18th Aug. 1910[2]	Sent to Calcutta Zoo, 7th Feb. 1913
25	♀	Vaynol; 2nd Nov. 1910	Killed 4th Apl. 1913
26	♂	(Born) Zoo. (Chartley + Vaynol × Highland); 23rd Aug. 1911	" 10th Apl. 1913
27	♂	4th Mar. 1912[1]	" 19th Nov. 1912
28	♀	30th May 1912	Sold 22nd Feb. 1913
29	♂	Cadzow; 7th Aug. 1912	?
30	♂	(Born) Zoo; 26th Oct. 1912	Killed 10th Apl. 1913
31	♂	" " 29th Dec. 1913[1]	Presented to A.H. Cocks 3rd Nov. 1914; killed 13th Nov. 1918
32	♂	Chillingham; 28th Jan. 1914	Living Aug. 1922
33	♀	" " "	1917, injured and killed. (Skull at Poynetts)
34	♀	(Born) Zoo [Cadzow + Vaynol Stock]; 8th Apl. 1915	Exchanged 30th Mar. 1916
35	♂	Woburn (Chartley × Longhorn) 27th Mar. 1919	Living Aug. 1922

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[1] Black.

[2] Chartley and Highland (?).

The original Chartley Bull certainly sired No. 3 (out of No. 2), and my recollection is that he only sired that one calf (No. 3), and that Nos. 4 and 5 (though possibly his offspring so far as time is concerned) were sired by No. 3, bred to his dam (No. 2), as was certainly the case with the calves from that time until probably No. 11 (inclusive); the calves having therefore one-quarter Chartley and three-quarters Vaynol.

The first six above mentioned are copied from the "List of the Vertebrated Animals" in the Zoo Gardens, 9th edit., 1896, and are certainly correct. The remainder has been made out very carefully from various sources, including notes by Mr R. I. Pocock, Superintendent, and a List kindly extracted from the Register of the Society by Mr Ockenden, Assistant Superintendent, but cannot be guaranteed as entirely free from error. ALFRED H. COCKS.

(*b*) NOTES ON THE COLOUR OF PARK CATTLE.

It is interesting to note that the first cross between individuals of the different old-established white breeds is very apt to be black; and at the same time to show a tendency to white stockings, more or less perfect. As the white bodies of the Park cattle are a negative of the black or snuff-brown of their ancestors, it is perhaps reasonable to suggest that the black flecks or patches on the legs below knees and hocks are an attempted reproduction in negative form of white stockings.

The following, picked from numerous instances, are good examples of these two points.

Lyme Park (Cheshire), cow born *c.* 1874, out of a cow in that ancient herd, by a Chartley bull, the first coloured calf recorded there. "Black, except irregular white blaze, a narrow line of white along the backbone, beginning a few inches in front of the withers; brisket, belly, and udder white, the black coming down rather lower behind the fore legs. Narrow bands of white round legs (like garters) just above the knees, and by, or rather below, the hocks" (*Zoologist*, 1878, p. 278).

Black female, calved 1913, at Faygate, Sussex, and given by Sir Claud Alexander, Bart., to A. H. Cocks, from Cadzow bull and Chartley cow, both white.

At the Zoo, a black bull born 1913, from white parents, a Cadzow bull and Vaynol cow, both white. The calf had long white stockings on both hind legs, and a short one on off fore leg. Irregular white shoulder stripe on right side, and tail tassel white. Given to A. H. Cocks.

At Poynetts, a female, from pure Chartley parents, viz., a white bull and black cow, was chiefly black, with blaze, an irregular white patch just behind withers. Left femur and hind foot white.

There are several other instances.

With Shorthorn cross, white stockings are quite common.

ALFRED H. COCKS.

G

Refer to page 123.

DEVON COWS' MILK RECORDS.

At the Bath and West Show at Plymouth 1922, there was a milk test for cows, open to all breeds. The breeds competing were South Devon, Shorthorn, Red Poll, Friesian, Jersey, Dexter and Devon, and thirty-one cows competed. The 1st prize was awarded to a Devon cow, W. G. Busk's "Wraxall Bluebell," and 2nd to another Devon, J. H. Chick's "Wynford Pill 2nd."

H

Refer to page 222.

SOUTH AFRICAN FRIESLANDS SOLD AT SLOUGH.

The sale conducted by John Thornton & Co. at Slough, on Thursday, 8th June 1922, was of a thorough record-breaking character. The catalogued number of lots was 83 (which included 101 animals), and the average for each lot was £1242, 15s. 10d., with prices running to 3900 guineas for bulls, 4300 guineas for females, and 1750 guineas for calves.

SUMMARY OF SALE.

Lots.							
28 Bulls	£1,383	15	0	=	£38,754	0	0
55 Cows and heifers	1,171	0	0	=	64,407	0	0
83 Gr. av.	1,242	15	10	=	103,152	0	0

Thirteen bull calves averaged £585, 11s. 6d.; and nine heifer calves £677, 16s. 8d. each; the bull calves making from 190 guineas (for a newly dropped one) to 1300 guineas; and heifer calves from 160 guineas (also for a newly dropped one) to 1750 guineas for one four months old.

VENDORS' AVERAGES.

There were nineteen separate exposers, and their respective lots averaged as follows:—

Name and No. Sold.	Average.		
	£	s.	d.
Hon. Joseph Baynes, C.M.G. (2)	740	5	0
H. N. Bekker (2)	498	15	0
D. P. Bennett (9)	873	16	8
Frank Bennett (1)	682	10	0
Sydney Bennett (1)	840	0	0
Colin Christison and D. C. Gradwell (22)	1328	9	6
Henry Cloete (1)	1260	0	0
E. E. Downing (1)	682	10	0
Julian B. Ehrlich (2)	945	0	0
Frasers Ltd. (1)	525	0	0
Golden Valley Citrus Estates, Ltd. (6)	1373	15	0
H. Hobson, Basutoland (1)	1575	0	0
A. A. Kingwill (14)	1572	15	0
Victor A. Morum (1)	840	0	0
A. & T. Murray (5)	934	10	0
Pepler Brothers (2)	735	0	0
Edgar J. Webb & Sons (4)	1483	2	6
West End Ranch, Mafeking (8)	1249	7	6
Jas. Woodin and D. C. Gradwell (1)	840	0	0

(From *The North British Agriculturist.*)

I

Refer to page 269.

HUNTER'S "FREE-MARTIN."

The external as well as the internal organs of generation are imperfectly formed and contracted, and there is usually also more or less of a masculine appearance noticeable. Robert Colling's famous "white heifer that travelled" was a free-martin by "Favourite" (252), her full brother being "North Star" (459). John Hunter in *Observations on the Animal Economy* confirms the general sterility of the free-martin or twin hermaphrodite; but exceptions were known before his time, and Loudon's *Magazine of Natural History* records the experience of Jos. Holroyd of Withers, near Leeds, who before 1826 reared twins together that bred freely on coming to the age of puberty. George Vasey in *A Monograph of the Genus Bos*, published in 1857, discussing Hunter's free-martin, declared that "there does not appear to be anything known of the peculiar circumstances under which, what is termed a free-martin is produced." The late Dr Berry Hart, M.D., of Edinburgh, carried out a series of investigations and in a "Note on a Case of Hunter's Free-Martin where there was Reversion to the Wild Park Cattle Type," relating to an animal bred by the late Dr David Brown of Muirhouse, Stow, he says: "The mother of the free-martin was a normal Shorthorn, the co-twin of the free-martin a normal and potent bull, afterwards castrated." James Henderson, M.R.C.V.S., pointed out "that it resembled the Wild Park cattle in having a white hide, black muzzle, black hoofs, blackish spots on the legs, and great timidity. This reversion in a free-martin was evidently a condition of great rarity and importance, and I know of no such case in literature." Hart goes on to explain "Hunter's free-martin is a sterile, genitally malformed bull, with small undescended testes and rudimentary *epididymes*, *vasa deferentia*, and Müllerian elements. *Vesiculæ seminales* are present. The *external genitals* consist of *labia majora*, *clitoris*, and the urinogenital sinus element (1 inch in length) of the vagina. The potent bull-calf and the free-martin are produced from one zygote (fertilised ovum), but the free-martin has allotted to it the hydatid testes and prostatic utricle given to a normal bull, usually the result of one zygote, and this gives it the exaggerated simulacrum of the female genital tract (see Fig. 1 in the *Proceedings of the Edinburgh Royal Society*, vol. xxx., 1910).[1]

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[1] **References**—(1) Hart, Dr Berry, "Numan, the Veterinarian and Comparative Anatomist of Utrecht: a forgotten observer on the free-martin," *Edin. Med. Journ.*, 1912, N.S., viii., 197. (2) Hart, Dr Berry, "The Structure of the Reproductive Organs in the Free-martin, with a Theory of the Significance of the Abnormality," *Proc. Roy. Soc. Edin.*, 1910, xxx., 230. (3) Lydekker, R., *The Ox and Its Kindred*, 8vo, London, 1912. (4) Schmidt, O., *The Mammalia in their Relation to Primeval Times*, Internat. Sci. Series, liv., 8vo, London, 1885; and "Note on a Case of Hunter's Free-martin, where there was Reversion to the Wild Park Cattle Type," *Edin. Med. Journ.*, March 1915.

J

Refer to page 340.

TUBERCULOSIS AS A HEREDITARY DISEASE IN MAN AND CATTLE.

Tuberculosis has long been recognised as an infectious disease, and the tuberculous diathesis was regarded as the determining factor. The disposition has been defined by Ribbert as "that peculiarity in the organism which allows of the effective working of the exciting causes of a disease." The diathesis of pulmonary tuberculosis, according to Pearson, is inherited, and the intensity of the inheritance is sensibly the same as that of any normal physical character such as stature, span, cubit, and eye-colour.

Childhood is the age at which the lung is most frequently infected. The child is most vulnerable, and as years advance the resistance increases. Where children are exposed to contagion from their parents, the amount of infection is five times greater than among those not so exposed. Various theories have arisen as to the source and origin of the predisposition. Is the child infected before birth, or is it a question of tuberculous disease in the parents and a transmitted weakness? Is it a true inherited strain or actual evidence of post-natal tuberculous infection? The possibility of transmission of the tubercle bacillus in the individual spermatazoon which fecundates the ovum is extremely small as nuclear material is never attacked by the bacillus. Transmission by the ovum may occur. As a rule, in congenital tuberculosis the bacilli penetrate the placenta by the blood-stream; in these cases the placenta itself is usually the seat of tuberculosis.[1] In man the number of cases of congenital tuberculosis is very small; it is more common in cattle.

Though one is infected in childhood there may be no evidences until later on in life; stress and strain of life awaken the infection. After the age of twenty-five people are less often infected. The incidence of acute tuberculosis in children, stated to be congenital, varies from 13 to 42 per cent. in collected statistics.

The existence of an inherited diathesis has frequently been investigated, and wide, varying statistical figures have been presented. In one series 42 per cent. of persons living in the same households (contacts) were infected. The amount of infection in the contacts shows a definite relationship to exposure to infection. If, for example, tubercle bacilli are present in the sputum of the patient, about 60 per cent. are infected with tuberculosis; if, however, the patient was non-infective, about 25 per cent. of contacts showed evidence of tuberculosis. From these figures it would seem that the presence or absence of infectivity is an important feature, contacts being much more likely to become tuberculous if the source of infection has the tubercle bacilli in the sputum as well as other evidence of tuberculosis.

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[1] Although this is rare even in women with advanced phthisis. When it does occur, it is usually confined to the maternal portion (the decidua), and only very seldom is it found in the villous portion.

In a series of figures published by Squire in his article on "The Influence of Heredity in Phthisis," evidence was produced to show that out of families in which both parents were free from tuberculosis, nearly 25 per cent. of the children became phthisical. If the parents were tuberculous but non-infective, about 26 per cent. of children and contacts developed pulmonary tuberculosis.

Reviewing these foregoing facts, the influence of heredity may be queried, and with concerted action tuberculosis may truly be a moribund disease. The sources of the tubercle bacilli ought to be diminished to the greatest possible extent, and in those cases where the soil exists the simple rules of the physiological life ought early to be enforced. The soil is the result of the seed and the seed is the tubercle bacillus which, since 1882, has been recognised as the causal parasite.

At the present time the question of heredity in phthisis is under review, and the theory of disposition is not so loudly acclaimed. The difficulties which arise in reviewing the subject are multifold, and when one considers that nearly everyone has or has had the disease at one time or another, it is no easy matter to show how far the influences of heredity extend, to the exclusion of every other factor involved.

In regard to tuberculosis in cattle, 30 to 35 per cent. of cows are tuberculous; of calves up to three or four months it is stated that 1 in 3000 show evidence of tuberculosis which is assumed to be congenital.

From the outset it is wise to discriminate between the inheritance of the disease itself and the inheritance of a tubercular diathesis.

It seems likely that the belief in the importance of heredity in the spread of tuberculosis in cattle was borrowed from the analogy of human tuberculosis.—NORMAN S. R. LORRAINE, M.D., D.P.H.

K

Refer to page 378.

PIG-STICKING OR HOG-HUNTING.[1]

Pig-sticking in India.—The more modern conditions of pig-sticking may be briefly described thus:—A beat is organised and the hunters are posted in parties of three or four at points of vantage along the edge of the jungle or cover. On a boar breaking cover the party nearest to him starts to ride him, each man racing to be first to come up with and spear the hog—thereby winning the honours of the run. If the boar is a good one he will go at a splitting pace for perhaps a couple of miles, and if he finds he can't escape, will stop at once, turn, and charge down like lightning upon the nearest sportsman. The "first spear" won, it remains for the party to unite their efforts to repel the attacks of the boar, and finally to overcome and kill him with their spears, which are retained in the hand throughout the encounter.

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[1] *Pig-sticking or Hog-hunting.* By Captain R. S. S. Baden-Powell, 13th Hussars; Milit. Sec., South Africa. (Harrison & Sons, 59 Pall Mall, 1889.)

Age.—The colour of a boar depends partly on his breed and partly on his age. The following are the signs by which the age of a boar is estimated. Up to *three years* the boar is very small, from the size of a rat to that of a young lamb, very hairy, with dark longitudinal stripes on back and sides. At this period of his existence he is termed a "squeaker," and is not ridden. The horn of the feet is soft and immature. At *four years* old he is brown, and the stripes have disappeared. He is long in the legs and thin in the body. Depends almost entirely on "jinking" (turning suddenly from the line of his flight) to effect his escape when pursued. Tushes very small, sharp, white, and unground. Feet still immature. At *five years* he darkens in colour, and his feet are fully formed. From *five to eight years* he is of a dirty black colour; runs fast, and jinks when overtaken, and fights when driven to it. Tushes come to full size at six years, and become worn, the lower against the upper, after that age. The feet, too, begin to wear away after six years. At *eight years* the colour becomes bluer; the boar reaches his full measurement of height and length. The muscles of the shoulder and forearm are more fully developed than in the "black" stage; the feet wear down. At *ten years* a new hoof of harder texture is formed, which thenceforward shows little sign of wear until great age is reached. The lower tushes begin to wear down and become greatly discoloured. Speed and activity decrease, but the boar grows proportionately fiercer and more prone to charge. At *twelve years* the colour becomes greyer, the lower tushes wear down and the upper ones become very long and curled and discoloured—the boar fiercer than ever. At *fourteen years* old age sets in. The boar becomes grey and often mangy, as Colonel Rice describes him, "dirty grey all over, like an old worn-out white felt hat." His tushes are worn or broken to stumps, and he cannot hold his own with younger rivals, and so takes to a solitary life, with a soured temper, like the old male of the buffalo, tiger, elephant, and other animal tribes. He will not run far or fast, preferring to make the best fight he can for his life so soon as pressed. At *sixteen to eighteen years* his teeth drop out, and his muscles subside away. *Twenty years* is probably the limit of age he attains, though a case is on record of a boar living till thirty years of age.

Size.—The largest complete measurements of an Indian boar that I have been able to verify are as follows:—

Height at withers, 38½ in.; length, 60 in.; girth, 55 in.; girth of forearm, 14 in.; tushes, 8½ in.; weight, 300 lb. One of 43 in. is recorded by Daniel Johnson (1827) in Bengal, but there is nothing to show how the measuring was carried out. It would appear that 42 in. in height is attainable, but that anything over 36 in. is rare.

Tushes.—The lower tushes of a full-grown boar average from 8 to 9 in. in total length, of which nearly two-thirds is embedded in the jaw. The largest tush recorded is that of a boar which was shot in unrideable country in the Gheer, in Kattiawar. This measured 12¼ in. Mr Williamson states that he has seen a single tush 11 in. long. The boar recorded above as standing 43 in. had a tush of 10 in. Any tush over 9 in. would be decidedly above the average.

A perfect pair of tushes should, if placed point to point and base to base, describe a complete circle. The upper tushes are very much thicker, shorter, and more curled than the lower, and are blunt. One I have now mounted as a stick handle measures $4\frac{7}{10}$ in.

Sow.—The sow attains her full height at five years of age, but does not stand so high as the boar in his prime (eight years). The highest I can find record of is 32 in., but that is exceptional. She is more heavily bodied, and does not possess such well-developed limbs and quarters as the boar. Several sows live in company and form the harem of one boar. A sow is in her prime from five to ten years of age, and produces two litters a year, the period of gestation being four months. The first litter will consist of two or three young ones, but each successive litter will increase in numbers up to nine or ten.

L

Refer to page 413.

BREEDING OF SWINE AND CURING OF BACON.[1]

Great herds of swine are kept at present in the county of Northumberland, and I have frequently seen farmers, at Ovingham and Newcastle fairs, selling shots (as they are called when they are six or eight months old), from twenty to thirty in a drove.

In Norfolk the swine are not of so large a breed as in this country; they weigh only from 6 to 10 st.; they are mostly used as pork. The intelligent farmers there say, that if it were not for their swine, they could neither feed their families nor pay their rents.

But though swine were kept so early in the south of England, it appears that they were very little known in the north of England and south of Scotland.

About the year 1760, one would scarce have seen twenty swine in a parish throughout Dumfriesshire; but about 1770 they began to be more plentiful, and every farmer kept one or two. A market was opened at Longtown, in Cumberland, about that time, or a little earlier, and a few carcases exposed for sale every Thursday in each week during the season.

In this country the different "varieties" of swine are so blended and intermixed one with another, that it is nearly impossible to mention any particular breed. The Berkshire pig is generally allowed to be a good kind, and is, I believe, preferable to many. They are generally of a brown, or rather reddish colour, with black spots; the ears bending forward, but not hanging down so much as those of the large Cumberland kind; short legged, small boned, and very easily fattened. Mr Culley mentions one of this breed which was killed in Cheshire, that measured 9 ft. 8 in. from the nose to the end of the tail, and $4\frac{1}{2}$ ft. in height, and weighed when killed 86 st. 11 lb. avoirdupois.

The Chinese, or black breed, are now common in Britain. They have short legs, are smaller, and their flesh whiter than the common kind. It is said this species is found in Guinea, and that it is very numerous in the Friendly, Society, and many of the other newly discovered islands in the South Sea.

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[1] Extracted from *Breeding of Swine and Curing of Bacon.* By Robert Henderson, Farmer, Broomhill, near Annan, 1814.

The real Highland hog is well adapted to the climate where it is found; it is well shaped, the bone small, and the ham plump, and when well fed is delicious eating. A cross between them and the Chinese breed, I apprehend, would answer well, as this would increase the weight of the Highland hog and add to the hardiness of the Chinese, and be the means of lessening the bone of the latter; a heavy carcase upon a small bone is the most proper animal for feeding, and this sort would be fattened with little food.

There is a breed of swine in Ross-shire, mostly black spotted, and of a very plump make, which seems to be easily fattened, and gets early to a proper size for porking. It is much superior to that diminutive creature that is so common in Fifeshire and the Lothians, which is neither easily fattened nor ever arrives to any considerable weight.

I have lately seen hogs of a black colour, at the Earl of Moray's, at Donibristle, that have close feet like a horse, instead of being cloven footed; but they seem to have nothing else particular about them to recommend them beyond other swine in that neighbourhood.

From Dunbar to Berwick the swine seem to be of a better sort, and will weigh more, but that may be owing to their superiority in feeding, as the practice of kitting (salting in tubs) pork for the London market is carried on at Berwick with great spirit.

In Northumberland they have a kind of black spotted swine, not very large, which makes good bacon and pork; it is not a pure breed, but rather of a mongrel kind.

The Cumberland breed is generally large, and mostly of a white colour; many of them would feed from 25 to 30 st., when fourteen or eighteen months old. They are strong boned, with large ears hanging down over their eyes so far as their snout. In that country families live much upon bacon, and it is very common to see three or four of these heavy swine hanging in a kitchen for family use. Almost every farmer keeps one or two breeding sows; they pay great attention to feeding them properly, and sell their sucking pigs at market towns when from six to eight weeks old; they are generally very large and fat, and will sell at from 12s. to 20s. each. It is common with them to give their pigs new milk from the cow twice a day the last three weeks they are upon the sow, as they then get strong and their dam cannot support them, at least to make them so fat as they are generally shown in the market.

Pigs sold in Carlisle market every Saturday through the season are bought by Dumfries jobbers, and taken to Dumfries market in carts on the Wednesday, where they are sold to the Galloway farmers for feeding.

In Westmorland their swine are not of so large a breed, this district not being so much of a corn country; they are, however, carefully fed, and reared to a good weight.

In Lancashire they keep good sizeable swine, mostly black and white spotted; they feed to about 20 st. In this county they feed mostly with beans, and other substantial food, and their pork is very firm. I have known them fed to such a degree that the animal could scarce eat anything; they would bake oatmeal into little balls, and when it began to loathe that feeding, give it new milk from the cow, often making it so fat that it could not rise. They manufacture very little into bacon, being mostly all sold in the market, by the feeder, in sides and quarters, for people to cure and dry for family use.

In Cheshire they keep a very proper sort of pigs; they are generally black spotted, with pretty large ears, which bend forward but do not hang so straight down as in the Cumberland hog, with short legs and broad back. Here they feed to great perfection, and pay the utmost attention to the animal; they are as regular in the cleaning and feeding of their hogs as with their horses. Cheshire being a great cheese country they have plenty of whey and other offals from the farm, which they keep carefully for their pigs. These hogs seem less mixed in breed than those in Scotland, every one being very much like another. They generally weigh from 20 to 25 st. The cheesing districts in Ayrshire are as well calculated for keeping pigs as Cheshire.

Great numbers of pigs are fed in North Wales. Jobbers and butchers from Manchester and its neighbourhood purchase large droves of them at Mould fair, in Flintshire, all of a white colour, plump, well-fed animals, all so much alike that one would have imagined they were all from one sow. The average weight might be 14 st. Most of them were fed in Denbighshire and Carnarvonshire. In South Wales, also, many swine are kept. But it is needless to mention a county here and there, for over all England and Wales swine are kept in large flocks, and are found of the greatest benefit to the community at large.

Of all the sorts of hogs I have seen, however, and that is not a few, I would give the preference to the Cheshire, or rather the Berkshire hog; this kind will grow to a good size, is easily fed, small boned, and of a handsome make. Many of them are of a singular reddish colour, and I have seen droves of them that when the sun shone on them appeared of the colour of gold. I wish very much to see them introduced into Scotland, and am certain they would be more profitable than any other breed.

M

Refer to page 414.

THE BREEDING AND ECONOMY OF LIVE STOCK.[1]

Reference is made to great numbers of English boars having been imported into Ireland during the previous thirty years to improve the **Irish Pigs**, which Dickson describes as "in general a very rough race of animals—colour white, standing very high on the legs, with long narrow carcases, thick coarse bone, rough bristles, long noses, and hanging ears. When well fed, however, they made pretty good pork, and when extra fed and long kept, very good bacon for which Ireland has been long famous." For hams in particular, Belfast was celebrated. White boars were mostly employed, with a few Berkshires and Hampshires, "the produce from the latter being larger than those from the white breeds." The principal English breeds were, according to Dickson, "the Suffolk, Bedford, Essex, Berkshire, Cumberland, Hampshire, and Yorkshire." The **Suffolk** was white with fine pricked ears, good symmetry, and small bone, feeding very fast—"the best bred race in England." The **Bedford** was a very high-bred pig, mostly white, "although a jet black was occasionally found." The **Berkshire** was a very different breed, larger in size, and generally spotted—well adapted for bacon. The **Essex** was a small, short breed "having many of the fine points of the Suffolks"; also a fast feeder, apt to get too fat. The **Cumberland** was a very fine breed of unknown origin, not native to that county, but liable to get too fat for butcher's porkers when from four to six months old. The **Hampshire** was "a large white, somewhat similar to the Berkshire, but with better symmetry and more compact," making fine bacon, for which the county was famed in the London market. The **Yorkshire** breed was a most useful one, being medium in size between the large and small kinds, "colour white, long carcase, straight full back, full hams, rather hanging ears, and very thin hair—in fact almost naked when young"—noted for the "equal distribution of the fat and lean."

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[1] From *The Breeding and Economy of Live Stock: being the Results of Forty Years' Practical Experience in the Management and Disposal of Cattle, Horses, Sheep, and Pigs.* By James Dickson, Cattle Dealer. (Adam & Chas. Black, Edinburgh, 1851.)

Of Scotch pigs the **Old Scotch White**, of large size, but rather coarse, was the most valuable, feeding fast to great weights. The greatest numbers were found in Dumfries and Galloway; Dumfriesshire was famous for bacon curing. Crossing with English breeds was practised, "but it was questionable if the bacon was improved as the old breed was quite fat enough. In the north of Scotland and in some of the Highland districts they had a small and half-wild breed, very narrow, with long hair on the shoulders, and thin short noses. The breed was often seen running nearly wild, but when aged and well fed it made delicious pork."

N

Refer to pages 502 and 541.

THE REGULAR PROGRESSIVE MOVEMENTS OF THE HORSE.

The following six plates are after photographs by Eadweard Muybridge, who revised and corrected the letterpress of the Third Edition of this work; they were first used, by permission, from advance sheets of the Standard Dictionary. Copyright by Funk & Wagnalls, New York, U.S.A.

Walk.—A method of progression, common to nearly all the terrestrial vertebrates, which is effected by a regulated succession of limb-movements, as described below.

If, in the quadrupedal walk, the notation begins with the landing of a right hind foot, the consecutive foot-fallings will be the right fore foot, the left hind foot, the left fore foot, followed by its diagonal hind, with which the record began. The time intervals of foot-fallings vary with different species of animals, but their sequence is invariably the same with all—the apes alone excepted, with which the landing of a hind foot is usually preceded by that of its lateral fore foot. During a single stride of a quadruped in an ordinary walk it is supported in eight different ways: twice upon the laterals; twice upon the diagonals; twice upon two hind feet and one fore foot; and twice upon two fore feet and one hind foot.

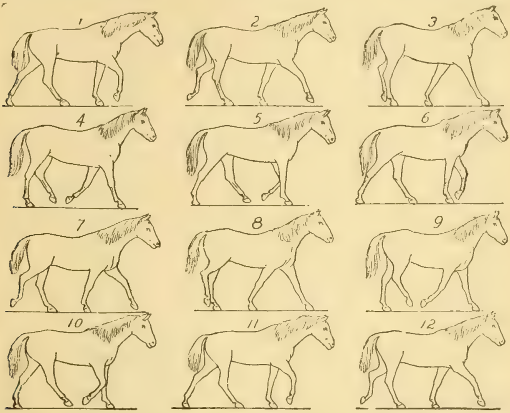


FIG. 103.—Some Consecutive Phases of the Walk.

The stride is completed at 10; 11 and 12 are the same as 1 and 2.

> "It is thus seen that when a horse during a *walk* is on two feet, and the other two feet are suspended between the supporting legs, the suspended feet are laterals. On the other hand, when the suspended feet are severally in advance of and behind the supporting legs, they are diagonals. These invariable rules seem to be neglected or entirely ignored by many of the most eminent animal-painters of modern times."—EADWEARD MUYBRIDGE, *On the Science of Animal Locomotion*, p. 8 [R. I. GT. BRIT.].

Canter.—A system of quadrupedal locomotion in which the feet are landed on the ground in the same consecutive order as in the walk, but not with the same comparative intervals of time. (*See* WALK.)

Assuming that in the canter the notation is begun after a propulsion through the air with a final thrust by the left fore foot, the landing will take place on the right hind foot, followed in order by the right fore, the left hind, and the left fore, from which a succeeding thrust off the ground will be effected. The consecutive supporting feet are:—(1) the right hind foot; (2) the right hind and right fore feet; (3) both hind and the right fore foot; (4) the left hind and right fore foot; (5) the left hind and both fore feet; (6) the left hind and left fore feet; (7) the left fore foot alone, from which the animal leaves the ground.

"The *canter* is usually regarded as a slow gallop, probably from the facility with which a change from one gait to the other can be effected; an important difference will, however, be observed."—E. M.

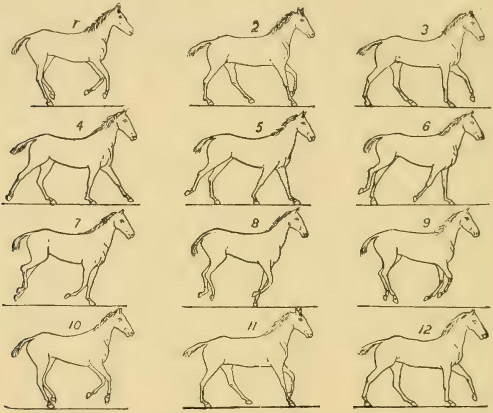


FIG. 104.—Some Consecutive Phases of the Canter.

The stride is completed at 10, and 11 and 12 are reproductions of 2 and 3.

Amble.—A method of progressive motion with the same sequence of foot-fallings as in the walk (*see* WALK), but in which a hind foot or a fore foot is lifted from the ground before its fellow hind foot or fellow fore foot is placed thereon, the support of the body devolving alternately upon one foot and upon two feet, the single foot being alternately a fore foot and a hind foot, and the intermedial supports alternately diagonals and laterals. (See Fig. 105 opposite.)

The amble is natural to the elephant, and in some countries to the horse, the mule, and the ass. The sequence of foot-fallings is the right hind, the right fore, the left hind, the left fore, beginning again with the right hind foot. At no time during the stride is the body of the animal unsupported. The amble has been erroneously confused with the rack or pace; it is the most gentle and agreeable to the rider of all methods of locomotion of the horse, whereas the rack is probably the most disagreeable and ungraceful.

"Out of the old hackney-pace to a fine easy *amble*."
BEN JONSON, *Every Man in his Humour*, Act iii., Sc. 2.

"The grey mare . . . breaking from her sober *amble* into a gentle trot."—DICKENS, *Barnaby Rudge*, pt. i., ch. 14, p. 167 [H. & H. '71].

"The *amble* and the walk are the only regular progressive movements of the horse wherein the body is never without the support of one or more legs; in all others the weight is entirely off the ground for a longer or shorter period."—E. M.

Trot.—A more or less rapid progressive movement of a quadruped in which the diagonal limbs act nearly simultaneously, and during which the body is entirely without support for varying intervals of time and distance.

When a horse is trotting at a high rate of speed, the fore foot usually precedes its diagonal hind foot in being lifted from and placed upon the ground, and the body will be entirely without support for about one-half of the total length of the stride. Beginning the notation with the landing of the right fore foot, the order of the supporting feet will be:—(1) the right fore foot; (2) the left hind and right fore feet; (3) the left hind foot; (4) without support; (5) the left fore foot; (6) the right hind and left fore feet; (7) the right hind foot; (8) without support. The time during which one foot alone is on the ground is very brief.

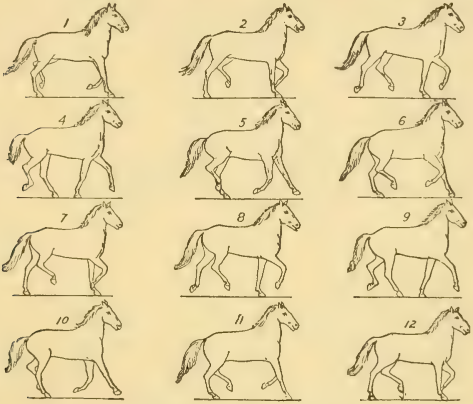


FIG. 105.—Some Consecutive Phases of the Amble.

The stride is completed between 10 and 11, and 11 and 12 show more advanced phases of the movement than 1 and 2.

"It appears somewhat remarkable that until quite recently many experienced horsemen were of opinion that during the action of the *trot* one foot of a horse was always in contact with the ground."—E. M.

Rack.—A method of progressive motion by a quadruped in which two lateral feet are, with nearly synchronous movement, placed upon and lifted from the ground, alternating with the other laterals, the body of the animal being in the intervals entirely without support. Sometimes called the PACE.

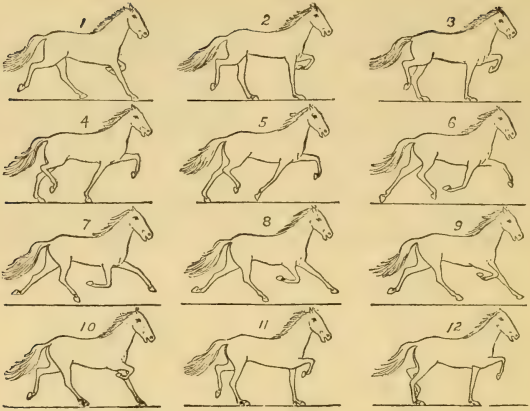


FIG. 106.—Some Consecutive Phases of the Trot.

The full stride is not completed until the right fore foot in 12 is brought to the ground as in position 1.

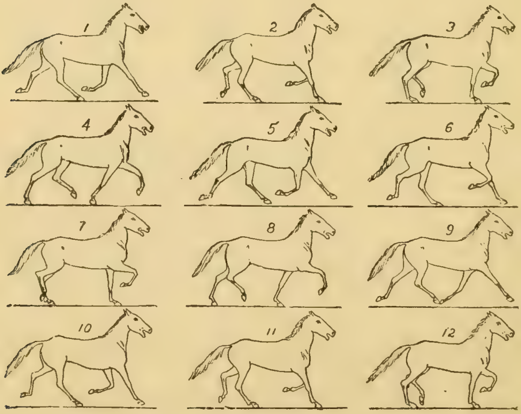


FIG. 107.—Some Consecutive Phases of the Rack or Pace.

The stride is completed at 10, and 11 and 12 are reproductions of 2 and 3.

With some animals the rack is a hereditary movement; with others it is acquired. A trained horse can make faster progress by racking than by trotting.

"The *rack* differs from the trot in the nearly synchronous action of the laterals instead of the diagonals."—E. M.

Gallop.—The most rapid method of progressive quadrupedal motion (sometimes erroneously called the *run*), in which the animal springs into the air from a fore foot and lands upon the diagonal hind foot.

If the notation of a stride by the horse during a gallop begins with the landing of a hind foot upon the ground, as, for example, the left hind foot, the right hind will next strike the ground and at a considerable distance forward; then follow in succession the left fore foot and the right fore foot, at a distance from each other sometimes equal to the height of the animal. The consecutive foundations of support (beginning the notation as above) are:—(1) the left hind foot; (2) both hind feet; (3) the right hind foot; (4) the right hind and the left fore feet; (5) the left fore foot; (6) both fore feet; (7) the right fore foot, from which the animal will spring into the air, in which phase (the only one of the gallop when the animal is entirely off the ground) all of the legs are flexed under the body. The first foot to strike the ground will be the hind foot diagonal to that from which the spring was effected. (See Fig. 108 above.)

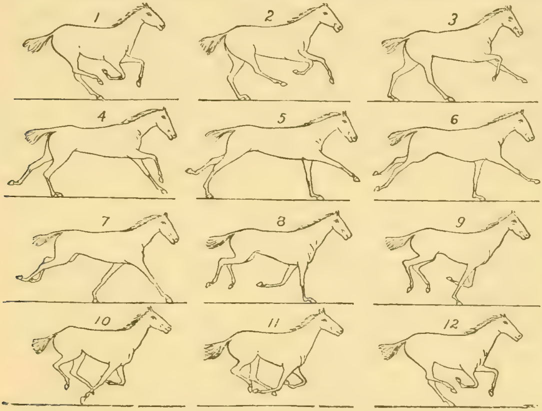


FIG. 108.—Some Consecutive Phases of the Gallop.
The stride is completed at 12.

"This movement [the *gallop*] has in all ages been employed by artists to convey the impression of great speed, although, curiously enough, the phase in which the horse has been almost invariably depicted is one which is impracticable during uniform progressive motion, and conveys no such impression to the careful observer."—E. M.

We call special attention to the following extracts from the definitions of **step** and **stride**, as applied to the progressive movements of man and the lower animals.

Step.—In animal locomotion, an act of progressive motion in which one of a pair of the supporting members of the body is thrust in the direction of the movement, involving the transfer of the support from the one member to the other.

"In the bipedal walk or run a step is one-half of a stride or full round movement. With all quadrupeds, except the kangaroo and other jumpers, four steps are necessary to complete a stride. In the walk these steps take place at approximately regular periods of time. In the trot the diagonals, and in the rack the laterals, make a step almost simultaneously. In the amble, the canter, and the gallop, these steps occur at irregular intervals of time."

Stride.—In animal locomotion, an act of progressive motion, completed when all the feet are returned to the same relative positions they occupied at the beginning of the notation of the movement.

"The normal stride of a biped consists of two uniformly executed steps. The normal stride of a quadruped consists of four steps. These steps may occur at separate and approximately regular periods of time, as in the walk; at separate and irregular periods of time, as in the amble, the canter, and the gallop; or in pairs, as they are effected during the trot with the diagonal, and during the rack with the lateral, members."

O

Refer to page 551.

INFECTION-PROOF WATERING SYSTEM FOR STOCK.

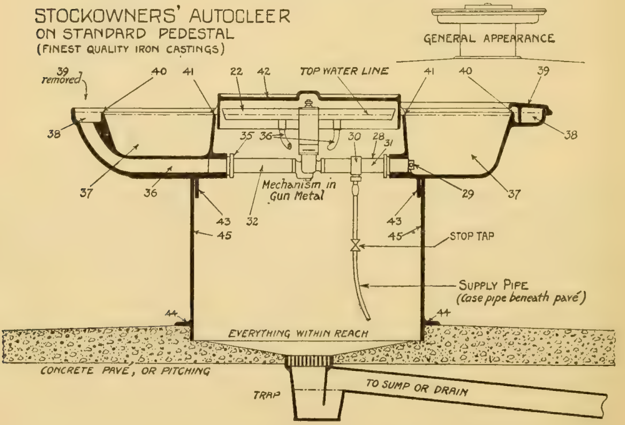


FIG. 109.

This vertical section shows annular container (37) supported on cast-iron column (45).

The drinking vessel or container is not used as a storage tank to pollute and stagnate the supply; just sufficient depth and width for the muzzles are provided. The perimeter is 12 feet, the watering capacity = a 15-feet trough. The container is easily emptied and cleaned.

The mechanism in a cast-iron cowl (42) is easily reached and taken apart without tools; supported by connections (35) screwed to bosses in the container (37). The automatic valve is controlled by variation of water load in tray (22). This tray is in flexible water communication at (36) with the container (37). Lowering of water-level opens the valve. Valve responds to very minute variations and opens and shuts instantaneously without concussion. Two simple finger and thumb adjustments (one pressure and one time) constitute the only initial regulation needed. Illustrated details are obtainable from Autocleers Registered, Triangle South, Bristol.

Water (either high or low pressure) enters branch (30), flows past the valve and delivery (32) to the coring (36) and to the channel (38).

Inside the box (28) a strainer arrests any solid matter when the supply is dirty; cleared by removing plug (29).

Annular channel (38) covered by distributors (39), conveys water evenly over the weir (40) around the container. Thence the flow is across the surface radially inwards, and deposits are rapidly swept past the overflow (41) into the drain.

Saliva insoluble in cold water floats, but is immediately ejected. When an animal disturbs the surface the flow starts, and it continues for a few seconds after the last muzzle is lifted. This ensures the removal of the last deposits.

The Autocleer practically eliminates a very serious source of infection. It rings round the very point from which an unsuspected case of water borne disease can most readily spread an epizootic outbreak. It should be erected in every well-appointed steading.

P

Refer to page 526.

FECUNDITY OF MULES.

Buffon mentions a mule in Spain that, between 1763 and 1776, gave birth to six foals. Lecante, a veterinary at Cerisy-la-Salle states that in 1844 he saw a premature fœtus dropped by a mule that had mated with a stallion. De Nanzio, rector of the veterinary school at Naples, reported in 1872 two cases of regular parturition by mules in Sicily, and gave an analysis of the milk of one of the mothers (*Gazzetta medico-veterinaria*, Milan, 1872). In 1873 the Paris *Jardin d'Acclimatation* was enriched with an Arab mule "Catarina," and a foal six months old, sired by an Algerian stallion. The foal grew up and reached an adult height of m. 1.45. Bred to the same stallion, "Catarina" gave birth to another female foal, not unlike the former one, and in appearance like a mare; afterwards, covered by an Egyptian jackass, she produced a male foal in 1875, and another in 1878. These two last animals, in spite of their three-quarters ass blood, were quite like ordinary mules.

In the journal *Allevamenti*, Palermo, 1921, F. Tucci reports an interesting case of a mule in the Zootechnical section of the "Agrarian Office" at Tripoli. This animal ("Mira"), he says, is twelve years old; in 1916 she gave birth to a female foal, and in 1920 to another, a male. A brand on her right shoulder shows that she is of Sicilian origin. Her head is rather heavy but shapely, her coat of a chestnut bay colour which has been inherited by her offspring. It is doubtful whether they were sired by a horse or an ass. Tucci reproduces photographs, and gives detailed measurements, of the three animals.

Q

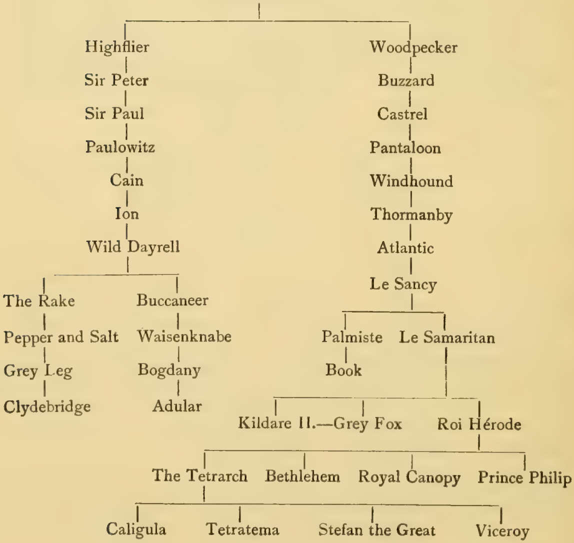
Refer to page 472.

TABLES OF THOROUGHBRED ANCESTRY

THE BYERLY TURK

THROUGH

HEROD



DARLEY ARABIAN

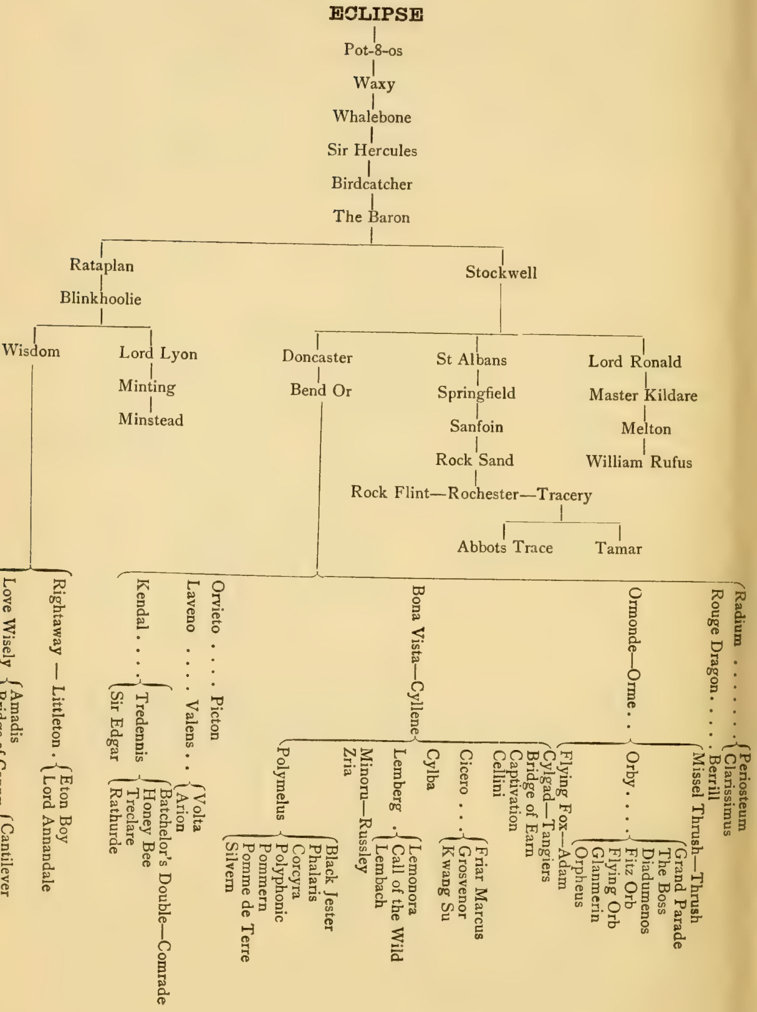
THROUGH

ECLIPSE

King Fergus
Hambletonian
Whitelock
Blacklock
Voltaire
Voltigeur
Vedette

- Speculum
  - Rosebery
    - Amphion
      - Lally—By George!
      - Sundridge
        - Sunstar
          - Craig an Eran
          - Alan Breck
          - Sir Berkley
          - Somme Kiss
          - Skyrocket
          - Galloper Light
        - Golden Sun
        - White Magic
        - Blink
        - Sunder—Sicyon
        - Radiant
        - Longtown
  - Hagioscope
    - Queen's Birthday
      - Holiday House
      - Santoi
        - Ballyheron
        - He
        - Yutoi
        - Santair
        - Achtoi
- Galopin
  - St Simon
    - Persimmon
      - Zinfandel
      - Pericles
      - Royal Realm
      - Prince Palatine—Prince Galahad
      - Your Majesty
    - Florizel II.
    - St Frusquin
      - Green Back
      - Planet
      - Lorenzo
      - St Amant
      - St Tudwal
    - William the Third
      - King William
      - Willaura
      - Roseland
      - Willonyx
      - Birlingham
    - St Serf
    - Juggernaut
      - Silver Jug
    - Chaucer
      - Stedfast—Sir Douglas
      - Bramble Twig
    - St Maclou
      - St Victrix
    - Simon Square
      - Square Measure
      - Hounam
    - St Florian
      - Ard Patrick—Huon II.—Attalus
    - Childwick
      - General Symons—Mount William
      - Aquascutum—By Jingo
    - Desmond
      - Stornoway
      - Hapsburg
      - Lomond
      - Sir Archibald—Irish Elegance
      - The White Knight
      - Saxham
      - Irishman
      - Charles O'Malley
      - Earla Mor
    - Soliman
    - Rabelais
      - Long Set—Service Kit
  - Galliard
    - War Dance
      - Perth
        - Poor Boy
  - Pioneer
    - Prospector
  - Donovan
    - Valasquez
    - Matchmaker

DARLEY ARABIAN
THROUGH



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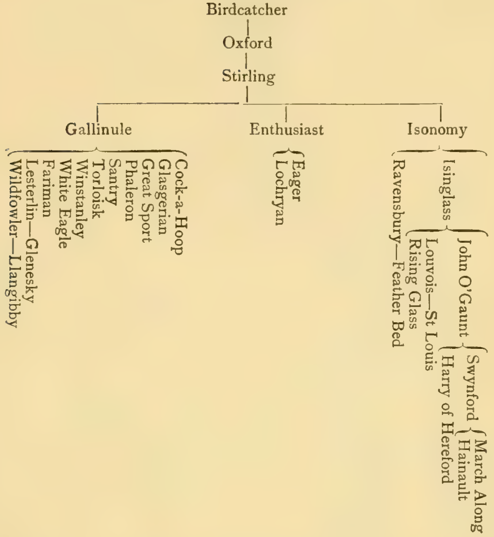

WINNING SIRES ARRANGED IN FAMILY GROUPS

SEASON 1921

Family.	Winners.	Races Won.	Value.
Bend Or	364	562½	£235,021
Galopin	361	538	138,864
Speculum	115	184	92,454
Sterling	163	255	89,396
Other branches of Touchstone	62	104	37,642
Other branches of			
1. Stockwell or Whalebone	68	105	37,179
2. Hampton	68	116	37,061
3. Herod	50	76	26,912
4. West Australian	51	70	20,072

The above copied from *Bloodstock Breeders' Review.*

DARLEY ARABIAN

THROUGH

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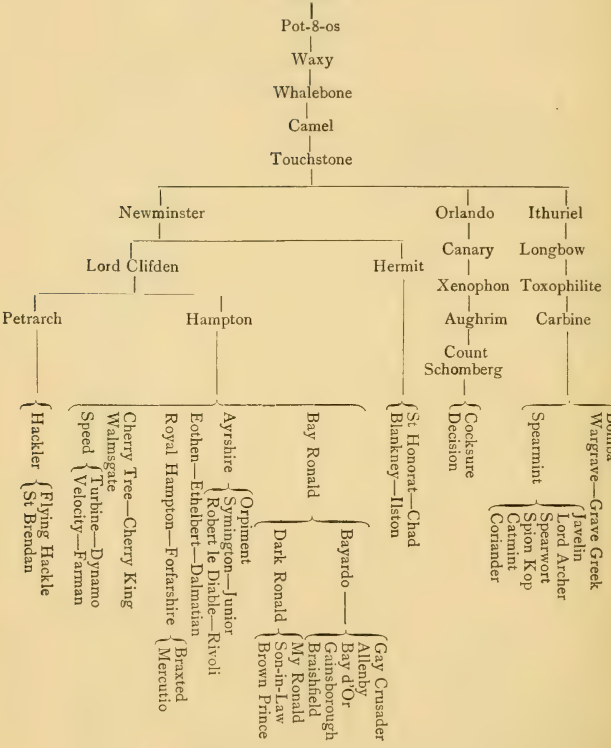

GODOLPHIN ARABIAN

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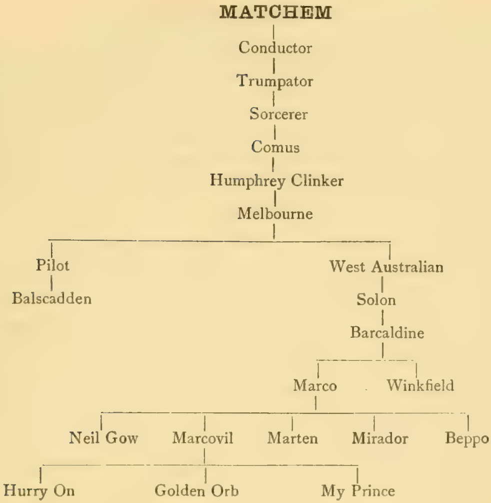

Q A

Refer to page 481.

ENDURANCE TESTS OF ARAB HORSES.

The third annual endurance tests, lasting five days, for Arab horses, were completed on Saturday morning, 30th October 1922, at Lewes. The Championship Cup was won for the second time by S. G. Hough's stallion "Shahzada," which travelled the 300 miles of the test in 37 hours 29 minutes, carrying 13 stone. He only lost 7 lb. in weight during the test. The Marquis of Huntingdon's "Shwaiman" was second with 38 hours 50 minutes, losing 14 lb. in weight.

R

Refer to page 655.

CORRIEDALE SHEEP IN AMERICA.[1]

A flock of Corriedales imported from New Zealand in 1914 was first taken to Laramie, Wyoming, but in 1917 to the U.S. Sheep Experiment Station, Dubois, Idaho. From the beginning, these Corriedales have been kept under range conditions, and they have shown their adaptability to the western ranges of the Rocky Mountain region. Ewes are producing fleeces ranging from 8 to 10 lb., and lambs at weaning time average approximately 60 lb. The fleeces are generally excellent and after shrinkage tests yield about 50 per cent. scoured wool.

While work has been going on with the Corriedales, the Bureau has at the same time been developing a type of sheep called the "Columbia" on the foundation of the Lincoln-Rambouillet cross; and in view of the fact that the Lincoln-Rambouillet cross interbred has resulted in sheep of larger size, producing a fleece averaging approximately 1 lb. heavier than the Corriedale fleece, and lambs at weaning time weighing about 10 to 12 lb. heavier than the Corriedale lambs at the same age, an attempt has been made during the last two years to combine the Corriedale and Lincoln-Rambouillet cross so as to obtain the excellent quality of the Corriedale fleece together with the heavy-shearing fleece of the Lincoln-Rambouillet, and also to secure a market lamb heavier than the Corriedale.

Corriedale rams have been used on the cross-bred ewes of the Experiment Station during the past five years, resulting in an approach to the pure Corriedale.

The American Lincoln-Rambouillet crosses seem to have given increased robustness in constitution, weight of fleece, and weight of market lamb.

The Bureau has also been testing the adaptability of Corriedales to farm conditions at the U.S. Experiment Farm, Beltsville, Maryland, and at the University of Illinois, Urbana, Illinois. Definite results have not as yet been obtained.

F. S. King Brothers, of Laramie, Wyoming, have some very good Corriedales, many of which, like those of the Bureau, trace back to the time that animals were imported in 1914. They breed Rambouillets much more extensively than Corriedales, and they have found it possible by mating some of their short-stapled Rambouillet ewes with Corriedale rams, to produce a very excellent wool—combing wool with a fineness of 56's to 60's in spinning counts—which sells well in the United States.

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[1] Memo from the Bureau of Animal Industry, Washington, D.C., 16th June 1922.

S

Refer to page 364.

EPIZOOTIC ABORTION—OFFICIAL EXPERT VIEW.

"The possibility of the bull acting as disseminator of infection has engaged the attention of several investigators, and there is now abundant evidence to hand to show that epizootic abortion is conveyed but rarely in this manner. Researches performed for the Departmental Committee on Epizootic Abortion (Report part 1, 1909, Cd. 4742) having confirmed the discovery that infection can readily be brought about by ingestion of virulent material. They state: 'Most of the circumstantial evidence which seemed to establish the bull as a factor of the first importance admits of another and more probable interpretation.' For example, it was held that when heifers which had never been in the infected byres, aborted at pasture, they must have been infected by the bull, but in such cases they are now in a position to say that if recently aborted cows have grazed on the pasture, the heifers may have been infected by swallowing grass or water contaminated by the discharge from the genitals of the former, or that virulent material may have been conveyed on artificial foodstuffs from the buildings.

"Without denying that the disease may sometimes be spread by coition, we think that nothing more than a quite subsidiary role in the spread of epizootic abortion can be assigned to the bull." Infection per vagina appears rare and there is abundant literature bearing on this point. The popular article on "Epizootic Abortion" by Sir John M'Fadyean, *Journal R.A.S.E.*, 1913, might be consulted, in which it is stated "in the light of recent researches it appears actually doubtful whether cows become infected in the conveyance of casual or accidental admission of the bacilli into the genital passages. Technical references are—**Schoeder**, *Journal American V.M.A.*, January 1920, page 374; **Hadley and Lothe**, *ibid.*, November 1916, page 143."

Excerpt from a **Letter of J. W. Wallace**, Ford, Thornhill, Dumfriesshire, 25th August 1922, which confirms the foregoing implication that the disease may be started by coition:—

"In my case abortion started through infection caused by the use of a contaminated bull. The bull got contaminated by serving a shepherd's cow which had picked calf. This happened at Glaisters in 1904. The infection, however, remained in the pastures at Ford for three years after it broke out, although the stock was sold out each year and fresh heifers bought in. The cases during the third year were less numerous than either of the two previous years. Indeed, every one of the cattle which were served by that bull,—and they only aborted,—the first year, the next two years cattle from both Glaisters and Monybuie aborted, the infection apparently being derived from the pasture."

T

Refer to pages 68, 71, 72, *etc.*

RECORD PRICES FOR LIVE STOCK.

The following interesting notes on Record Prices are mostly taken from a lecture given by David M'Culloch to Aberdeen University Agricultural Society in February 1922.

For Shorthorns the highest price ever obtained at public auction in this country was brought by a Clipper bull calf, bred by Mrs Duncan Stewart of Millhills, Crieff, and sold at Perth in 1920. This was purchased for 6600 guineas by Mr Elliott, a young Canadian farmer. In 1919 Wm. Duthie, Collynie, had 5300 guineas for a Lavender calf, and in 1920 got an average of £1400 for his crop of twenty-four bull calves. Thirty years ago Wm. Duthie's average was £34, 16s. 4d. Wallace of Balcairn sold a bull calf for 5100 guineas, and had an average of £1149 for twenty-five. As an instance of the remarkable boom in prices, a bull calf was bought at Aberdeen in 1917 for 180 guineas. At Penrith, where he won the championship, he was bought for 4750 guineas by Marshall of Stranraer. These prices compared favourably even with those obtained in the time of the Duchess boom—*e.g.*, 4500 guineas obtained at the 1875 Dunmore sale for the bull "Duke of Connaught," and 4300 guineas and 4100 guineas respectively for two cows got by the Hon. H. H. Cochrane in 1877.

For Aberdeen-Angus the record auction price was 3000 guineas obtained in 1920, and again in 1921 for yearling bulls, bred by the late Charles Penny of Skillymarno, and Marshall and Mitchell, Bleaton, respectively. The record for a female was £1365 paid by F. L. Wallace to D. M. Allan, Ballintomb, for a yearling heifer. James White's bull "Perinthian" was sold privately for export to the United States at £6000.

Among the many sensational prices for Friesians, that of 5300 guineas for a cow at Lord Rayleigh's sale in June 1919 was the highest. (See Appendix H.) The record for Ayrshires was 1780 guineas for the yearling bull "Hobsland Mendel" (see p. 340). For West Highlanders 400 guineas were got by Stewart of Lochdhu.

Among Clydesdales the record price was £9500 for "Baron of Buchlyvie," the sire of "Dunure Footprint," the greatest living sire of the breed. At Lanark £3400 was paid for the yearling colt "Record." At Dene House Farm dispersion in 1919 the brood-mare "Dunure Glad Eye" made 1850 guineas. In thoroughbreds "Kendal" and "Galtee More" brought £20,000 each.

For Border Leicester sheep the highest price was 1100 guineas paid to Findlay, Mill of Marcus, for a shearling ram.

U

BABY BEEF. (BY A RED POLL BREEDER.)

From *The Newcastle Daily Journal*, 17th December 1921.

As questions are being raised as to the utility of the baby beef classes which were introduced for the first time at this year's Smithfield Show, and as it is also suggested that the production of baby beef is carried on chiefly by wealthy men, I should like to give my experience.

Everybody is agreed that cattle have been fed at a great loss this year, but as to baby beef being a failure I cannot agree. I am a farmer pure and simple, and have to get my living from the land, and to show that Red Poll baby beef can be produced I should like to point out that my exhibit at the recent Smithfield Show, weighing 7¾ cwts. at one year two months, and winning second prize, was born on 15th September 1920, weaned 1st October 1920, and during October did not receive more than four pints of milk per day. It never tasted any milk or calf meal after 1st November 1920, but went straight on to oats, beans, cake, and hay, and I am perfectly sure this calf did not have any more than 45 gallons of milk.

I have not yet received the account of his sale in London, but I understand it was a little over £5 a cwt. This works out at about £40 for the steer at 14 months old. Then take the two-year-old Red Poll steer of Mr W. Woodgate, which I believe was the heaviest in his class, weighing 12 cwts. He was 8½ months older than the baby steer, and put on 4¼ cwts. in the extra time. This works out at £5 a cwt.—£21, 5s. for the 8½ months extra keep, and the animal must consume more the last 8½ months, so he does not make so good a financial return as the baby steer.

Then, take my first prize Red Poll steer, under three years old. He is one year four months and two weeks older than the baby steer, and weighs 15 cwts., which is 7¼ cwts. more than the baby steer for 16½ months longer keep. This works out at £5 a cwt.—£36, 5s. for the extra 16½ months keep, and he must, on account of his age, have consumed even more bulk of food than the two-year-old of Mr Woodgate.

I also understand that the three-year-old steer made just £5 a cwt., and the baby steer a trifle over, so working on the age system it comes out as follows:—Baby beef at 62 weeks old, average 12s. 6d. per week from birth; two-year-old steer, 100 weeks old, average 12s. 2d. per week; and the three-year-old steer at 132 weeks old, average 11s. 6d. per week from birth. This I think clearly shows that the baby steer brought more and a quicker return than either of the other two steers.

Take the account of a small farmer who keeps, say, ten cows and breeds ten calves in a year; with baby beef he could turn out say ten calves at £35 a piece, but if he kept them until they were two years old he would probably have to bring more capital into his business, which at 5 per cent. would be a charge of 35s. on to each animal. If he kept them another year so that he sold them as under three years of age, he would want still more capital, and the interest per animal for the two years would be somewhere about 70s. apiece.

A. CARLYLE SMITH.

SUTTON HALL, WOODBRIDGE, SUFFOLK.

V

Refer to page 759.

WILD GOATS IN THE HIGHLANDS OF SCOTLAND.

Dr James Ritchie, in *Animal Life in Scotland*, p. 107, says:—"The goat, offspring of the wild goat (*Capra ægagrus*) of the Mediterranean Islands, Asia Minor, and Persia, notwithstanding its early introduction to Britain, and its former abundance in the Scottish Highlands, has suffered at our hands no change worthy of remark." The passage of a flock of goats, it has been said, will do quite as much damage as a bush-fire. "In the parishes of Urquhart and Glenmorrison, in Inverness-shire," for example, "goats were formerly numerous but have been discouraged, as injurious to plantations," and "the extension of woodland in all areas open to the inroads of flocks" (of sheep and goats) "has been prevented." When discovered by the Portuguese in 1502, St Helena "was covered with luxuriant forests and a rich assemblage of peculiar plants," but goats, introduced in 1513, greatly increased, and ultimately suppressed forest regeneration, with the result that "the island has become a barren and rocky waste."

Prehistoric bones of the goat were found in a rock shelter near West Kilbride in Ayrshire in 1879. Goats were at one time more numerous than sheep in the Highlands of Scotland. The will of Rob Roy in the capacity of a small farmer, dated 1738, showed the relative proportions of different kinds of stock on his holding to be, 12 cattle, 12 sheep, 23 goats, and 5 horses.

When sheep stocks extended to the high mountain areas, common goats, probably never properly domesticated, were let loose to occupy the precipitous places dangerous for sheep to climb, and drive them away to lower elevations. Goats, displaying a prophetic weather instinct, only come down to the low ground when stormy weather is near. On the authority of Mrs Duncan Ferguson, seventy-nine years of age, a Gaelic-speaking native of the Brig of Turk district, wild goats, mostly light grey but some dark brown, have existed on Ben Venue, Perthshire, since she remembers, and for generations before her time. This may be taken as a typical example. Three heads of bucks, shot from this flock on Achray,[1] Callander, are shown in Plate CCXXIII. B.

Although the total numbers greatly declined, and in some districts became almost extinct towards the close of last century, many flocks still exist on the higher mountains. Such animals, and others from the Western Islands like Oronsay (not injured constitutionally by in-breeding, through shrinkage of numbers), will, when domesticated, make excellent foundation stock with which to extend the goat industry for the production of a pure milk supply among crofters and small-holders.

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[1] By Captain R. T. Hinckes, of Foxley, Hereford, game tenant, 1922.

W

Refer to page 462.

MERITS OF SHIRE HORSES.

A. B. Charlton, Secretary of the Shire Horse Society, has explained the position discussed at page 462 as follows:—

"The Shire Breed has been largely exported in the past, but in common with all other Breeds the export trade has diminished owing to the world-wide disturbance arising out of the War. Foreign buyers hold that the Shire is too slow for them, but this view is not endorsed by the tenant farmers and cartage contractors of England and Wales if the favour which they extend to the Shire-bred gelding is any criterion. Exception is taken to the feather as detracting from the usefulness of the animals when working on the land or on muddy roads, though the type of underlying bone can be judged from the quality of the hair. Long silky hair means hard ivory-like bone that will endure for years. The hair is also a protection against heat in the tropics and the cold in England. The oily exudation from around the hair follicles is protected by the length of the hair; so that the skin does not so readily crack from dryness, and dirt does not so easily enter the pores of the skin. This diminishes the chance of grease, which is most commonly caused by the entrance of infective material into a crack."

X

Refer to page 495.

PACK HORSES.

In *A History of Penistone*, J. N. Dransfield says: "Down to the year 1730 the whole of the cloth manufactured at Leeds was brought to market on men's or horses' backs. Coals were in like manner carried from the pits on horseback (THORESBY)." The cloth packs were carried by the "bell horses" or pack horses; and this mode of conveyance continued until the end of the eighteenth century. The pack horses only ceased to travel about the year 1794 (SCATCHARD).

Y

Refer to page 263—*footnote.*

Lithoderm is a comparatively new waterproofing material, invented by J. Wilson Dougal, B.Sc., Edinburgh, which is destined to supersede the common linseed-oil and white-lead paint, for inside as well as outside work on the farm. Put on like paint, it presents a surface little altered in appearance or colour, upon which moisture does not settle; is equally effective on sandstone, cement, wood, or metal, for purposes of preservation and disinfection. A gallon costing 7s. 6d. is capable of giving one coat to 60 to 70 square yards. The sole agents are The Edina Chemical Company, 17 Spring Gardens, Abbeyhill, Edinburgh.

Z

Refer to page 300.

The Author's attention has been called to an ingenious little instrument, a **Live Stock Computer**, patented by G. H. Meire, Eyton-on-Severn, Shrewsbury, which gives at sight the values of animals: (1) by comparison; (2) at a live-weight price; and (3) at carcase price.

A1

Refer to page 671.

SPREAD OF THE RYELAND SHEEP.

In a letter to the *Mark Lane Express*, the Secretary of the Breed Society writes:—"To-day there are flocks not only flourishing in Herefordshire, the native home of the breed, but also in Breconshire, Monmouthshire, Shropshire, Worcestershire, Gloucestershire, Glamorganshire, Pembrokeshire, Cardiganshire, Berkshire, Hampshire, Oxfordshire, Somersetshire, Yorkshire, Hertford, Northampton, Roxburgh (Scotland), Cumberland, Essex, Surrey, Sussex, and Kent, etc.

"Now here you have a list of over twenty counties, which is a good slice of the British Isles, and the Ryeland thrives under any and every condition. Moreover, the breed has been exported to the Continent of Europe, Australia, New Zealand, South Africa, and South America. This is ample evidence of extension.

"I am one of those who realise that there is room for every British breed. The world is calling for every variety. The Ryeland is one of great antiquity. It held sway from 100 to 200 years ago. Then came a long period of neglect, covering perhaps four or five decades, but happily the farmers of Herefordshire and Breconshire kept 'the flag flying,' and now the breed has come 'into its own' again. This is a day for medium-sized sheep of quick-maturing good quality, with wool fine in fibre, deep in staple, and thickly set on the skin—a general utility fleece, and answering for best hosiery purposes. The Ryeland fulfils all those requirements. Hence its popularity."

W. H. Woodcock, *Secretary.*

19*th September* 1922.

B1

Refer to page 592.

INTRODUCTION OF CHEVIOT SHEEP INTO THE FAR NORTH OF SCOTLAND.[1]

In the year 1807, Anthony Marshall and Adam Atkinson, grandfather and great-grandfather of J. R. Marshall of Chatton Park, Belford, Northumberland, cleared a number of Border Hill farms, including the whole of the Kidland lordship, of their running flocks of Cheviot sheep, taking the shepherds with them. They were the first to go to Achinduich, close to Lairg, where they occupied a block of country some 30 miles long, and which now includes the farms of Klibrick, Bhinarmine, Halmidary, Knocken, Achinduich, and Letterbeg. The highest point was Ben Klibrick, in the centre and highest part of Sutherland. The droves were taken by road and across two ferries, over the River Forth and the Moray Firth; nevertheless some thirty ewes found their way back to their own ground before the lambing season in the following spring. They must have chosen a course well inland, where the rivers and tributary streams were small enough to be forded. The sheep were closer skinned and shorter woolled than the Cheviot of the present day, and the wool was reported to be almost as fine as Merino. When the cast ewes and younger sheep were brought to low ground they grew to a good size. The dinmonts, brought to feed on turnips on good feeding land in Northumberland, fed to 25 lb. per quarter. The occupation by the Marshall family continued till 1890, or for three leases of twenty-one years and one lease of nineteen years. For many years, practically extending over the tenure of the first two leases, the hoggs were all wintered on the ground; but later it was necessary to procure hogging farms in the lower country where good crops were grown and a stock of cattle kept. One of the last held was Seafield, near Portmahomack, in Ross-shire.

C1

Refer to page 553.

RELATIONS BETWEEN GRASS DISEASE IN HORSES AND BOTULISM.

During 1920-21 grass disease had spread over the south of Scotland and north of England: cases have been observed as far south as St Albans. Recent researches and field experiments during 1921 suggest that the *Bacillus botulinus* (sausage poison)—the agent responsible for the deaths of eight people at Loch Maree—sets up grass disease, and a botulinus antitoxin has been prepared and largely used as a preventive. The Veterinary Insurance Coy. will only accept the risk for grass disease if the animal has received a dose of the serum. The Loch Maree inquiry resulted in the Ministry of Health preparing and keeping on tap an antitoxin for human use to allay public feeling; but it is doubtful if it will be of much practical utility, for its efficacy is confined to the period before the symptoms have begun to manifest themselves.

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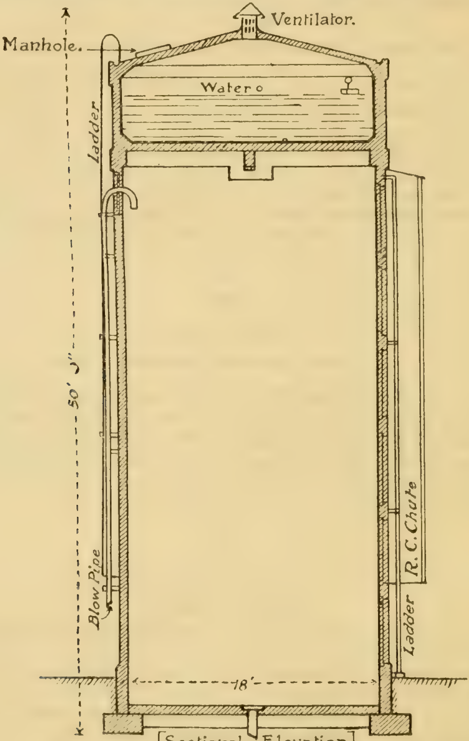
[1] See also *Scotland and Scotsmen in the Eighteenth Century* (p. 517), from the MSS. of John Ramsey, Esq., of Ochtertyre, edited by Alex. Allardyce (Wm. Blackwood & Son).

D1

Refer to Plate LXXXI., *facing page* 376.

REINFORCED CONCRETE SILO.

The **Reinforced Concrete Silo** shown in Fig. 110, with a **Water-tank** on top merely for convenience in storing and giving a head to a water supply, made by James Scott & Son, Aberdeen, is in form and material up to date.



[Sectional Elevation]
Reinforced Concrete - Silo and Water Tower

FIG. 110.

Following the example of Canada and also of the United States, where over a million silos exist, silos have in recent years been erected in heavy land districts in this country; and on the dry East

Coast, where the growing of turnips is uncertain. A mixed crop of forage plants, for example, beans, peas, vetches, and oats, can be varied almost indefinitely and made to provide summer-feed conditions throughout the year, admirably suited to all classes of live stock, but of special advantage to dairy cows.

This silo is proof against weather, vermin, and fire, and requires no upkeep.

Table showing Size, Internal Capacity, and Animals Fed.

Dimensions.	Capacity.	Feed for Six Months at 50 lb. per day.
14′ diameter × 36. . . .	140 tons	35 cattle.
14′ ,, × 40. . . .	175 ,,	44 ,,
16′ ,, × 36. . . .	195 ,,	48 ,,
16′ ,, × 40. . . .	230 ,,	57 ,,
18′ ,, × 36. . . .	250 ,,	62 ,,
18′ ,, × 40. . . .	280 ,,	70 ,,

Cost of construction in 1922 = 16′ × 50′, £440; 12′ × 40′, £415; and 12′ × 30′, £370, being a 25 per cent. reduction since 1920.

E1

Refer to page 68.

RICHARD BOOTH'S "PERFECT" COW.

It was from a common Darlington market cow, no doubt of special merit, that Richard Booth, by three crosses with quality bulls, produced at Studley the so-called "**perfect**" **cow** "Isabella," which introduced "the massive yet exquisitely moulded fore quarters into the herd, and the straight underline of the belly, for which the Warlaby cattle are remarkable."

F1

Refer to page 423.

THE DUNLEY SELF-ACTING DRY PIG-FEEDER.

This feeder was developed by Sir Alfred Herbert on his farm at Dunley, Whitchurch, Hants.

Inside a substantial framing of well-seasoned wood, mounted on wooden skids to facilitate removal, for convenience in feeding and distributing the manure, is suspended by short chains to the ridge beam, a central hopper of triangular section shown in Fig. 111 below. At the bottom of this hopper there is a narrow opening from end to end which fits over a piece of wood, triangular in section, which divides two troughs fitted with galvanised linings. The hopper is adjustable vertically by a fluted nut at each end, so as to prevent the food falling through when the hopper is stationary, but to permit it to drop into the troughs below when the hopper is shaken. Two side doors, swung from under the eaves of a triangularly shaped waterproof roof (shown on the figure), obscure the troughs when not in use, and protect the food from wind, rain, and snow, and from sparrows and other vermin. A pig easily learns to press against one of the side doors, which swings inwards and comes in contact with the suspended hopper, which is thereby shaken, so that a certain amount of food slips down into the corresponding trough. A deflector is introduced to prevent food going into the second trough when only one side of the feeder is in use. If the hoppers are filled once daily, well-graded lots of ten or twelve pigs can be fed with advantage, with a saving in labour, in food, and in wire fencing. "The feeder can be used either with meals (dry) or with whole grain mixtures, such as maize, beans, offal barley, or wheat, oats, etc., with an admixture of fish meal."—**Makers**: ALBERT HERBERT, Lim., Coventry.

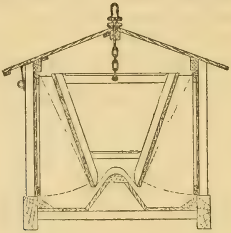


FIG. III.

G1

Refer to page 583.

SHETLAND SHEEP.

Owing to the different times that sheep come ripe for pulling the fleece, they are unsuitable for high ground and are difficult to gather; in fact, management is impossible if they are to be kept in any number on an extensive area of ground. They don't do well on green land, such as an island. I find at Ardintoul they are subject to more evils than Blackface or Cheviot sheep. Altogether, I know no place suitable for them like Shetland and its crofting people, where the land is easily gathered and the area of land not very great. While the wool is valuable for its own purposes and can be made use of by the women of the croft, it can probably be contended that a Shetland ewe is worth as much as a Blackface ewe and Cross lamb; but where the land is fairly good (I am talking of Shetland) a Blackface ewe and Cross lamb (Leicester tup) is worth a great deal more than a Shetland ewe and lamb. JAMES SCOTT.

FEARN, ROSS-SHIRE, 10*th November* 1922.

H1

Refer to page 516.

LIST OF PROMINENT BREEDERS OF DALES PONIES.

Bell, Henry, Foulding Steads, Haltwhistle. Charlton, Roy B., Linnels, Hexham. Christie, Capt. T. S., Wardrew, Gilsland. Dalton, J. W., Snowhope Close, Stanhope. Forster, J. L., Carrshield, Whitfield, S.O. Hunter, John, Espgreen, Iveston, Leadgate. Hutchinson, Robert, West Dean Row, Langley. Peart, J. W., Hill End, Wearhead. Roddam, Geo. N., Whitfield House, Wolsingham. Sanderson, P. E. and A., Front Street, Stanhope. Vickers, T. H., Thornley Hall, Tow Law.

I1

Refer to Index.

PEDIGREE LIVE STOCK IN ENGLAND AND WALES.

A Census of pedigree live stock, eligible for registration in *Herd*, *Stud*, or *Flock Book*, was taken on 15th December 1919, and again on 4th June 1921. The returns do not represent the total number of pedigree animals in the country, as they do not include beasts owned by persons, probably most of them engaged in cross-breeding who are not members of Breed Societies, and only 90 per cent. of the schedules issued to members of Breed Societies were returned. Tables 11 to 14 of the Ministry of Agriculture Report, dated November 1922, although not complete, indicate the size of the "reservoir" from which the supply of pedigree stock of the different breeds is drawn, whether for home or export. Adding 10 per cent. to the figures returned, the probable **number of pure cattle** in England and Wales reaches 150,000. About 43,000 were returned as **Shorthorns**, widely spread, but predominant in Cumberland, Westmorland, Lancashire, and Yorkshire; and in the Midlands from Gloucester to Northampton. **Lincoln Reds** come next with 17,700 pure animals, of which three-quarters are in Lincolnshire. The **British Friesian**, with 14,000 animals, takes third place in numerical importance. The **Blue Albion** Breed Society returned 505, chiefly from Derbyshire, and the **Old Gloucester**, which numbered 230, are mainly in their native county.

Pedigree sheep returned reached 710,000, equal to a total of 800,000. The **Hampshire Down** with 130,000, chiefly in Wilts, Hants, and Dorset, took the lead, followed by the **Southdown** with 81,500, of which over 55,000 are in Sussex. **Lincoln** and **Kent sheep** chiefly appear in their name counties, but the **Suffolk**, the fourth largest breed numerically, is much more widely distributed, centring on Suffolk and the adjoining counties.

In pigs, with a returned total of 76,411, the **Large Black**, numbering 30,493, far outstripped all other breeds. **Gloucester Old Spots** had 12,318, **Large White** 11,130, **Middle White** 8519, and **Berkshire** 5090. The **Wessex Saddleback** is widely distributed, although about one-third are in Hampshire, while the Essex pig is almost confined to its home county.

The **returns of pedigree horses** are less complete, only 84 per cent. of the forms having been filled. The **Shire**, with 32,098 animals widely distributed over England and Wales, out of a total of 55,057, is by far the largest registered pedigree breed.

Even when Scotland and Ireland make up for lost time and come into line, the total numbers of pure stock form a dangerously small basis for the prosperity of the vast ranching areas of the world now fed from the British fountain-head of pure blood.

J1

Refer to page 761.

IMPORTED GOATS AND 1922 MILKING RECORDS.

Government restrictions against the introduction of contagious disease among our farm animals have prevented goats being imported into this country since 1903 (when a limited number were secured by the British Goat Society from France) until 1922, when the Hon. Secretary, Thos. W. Palmer and H. E. Hughes were deputed to proceed to Holland and Switzerland to make other selections consisting of 46 animals—29 Saanen goats (11 male and 18 female) from Holland and 17 Toggenburg goats from Switzerland (8 male and 9 female). Fresh blood was urgently needed to curtail intensive in-and-in breeding, and to make improved breeding possible. Among those who bespoke imported animals were Lord Dewar, The Countess Bathurst, Sir Geo. H. Fisher Smith, Miss Henderson of Hexham, Mrs J. C. Straker of Corbridge, The Sussex County Goat Club, and the West Surrey Goat Club.

Goats are recorded under the Ministry of Agriculture's Milk Recording Scheme, and a class for such goats was instituted at the Dairy Show in 1922. The following resulting figures show present possibilities:—

Days in Milk.	Total Yield.	Average per Day
212	2379½ lb.	11 lb. 3 oz.
212	2165¾ ,,	10 ,, 3 ,,
174	2014¼ ,,	11½ ,,
178	1998 ,,	11 ,, 3 ,,

The milk is rich in butter-fat, but owing to the fat globules being much smaller than those in cows' milk, it is more easily digested, and is therefore an ideal food for infants and invalids.

K1

Refer to pages 188-192.

SMITHFIELD SHOW CHAMPIONSHIPS, 1922.

The **Supreme Cattle Champion** was "Blue Bill," a second cross blue-grey steer, also Champion at Norwich and Birmingham; sire Aberdeen-Angus; dam Shorthorn-Aberdeen-Angus, bred by Lt.-Col. G. A. Ferguson, Pitfour, Aberdeenshire, and shown by Sir R. A. Cooper, Bart.; weight at 2 years 7 months 1 week = 15 cwts.

3 qrs. 11 lb. The **Reserve Champion** was "Rambler," an Aberdeen-Angus steer; Breed Champion at Aberdeen. Bred and shown by the Earl of Durham, K.C.; age 1 year 11 months 2 weeks; live weight 13 cwts. The **Heaviest Animal** shown was a British Friesian steer, "Felhampton Candidate," first in his class; weight 19 cwts. 1 qr. 18 lb. at 2 years 10 months 2 weeks. Bred and shown by J. and B. M. Dale, Felhampton Court. The **Aberdeen-Angus Breed Cup** went to the Earl of Durham's "Rambler," a yearling by "Luck of the Burn"; the **Highland Breed Cup** to the Duke of Atholl's "Seer," 3 years 7 months 2 days; weight, 14 cwts. 2 qrs. 9 lb.; the **Galloway Breed Cup** to the yearling steer "Worthy" by "Sapphire," Breed Champion at Edinburgh. Bred by J. Cunningham, Tarbreoch, and shown by Robert Graham, Auchengassel; weight, 11 cwts. 2 qrs. 20 lb. at 1 year 8 months. In the **Carcase Competition** the Cattle Championship fell for the second year in succession to A. Palmer of Wonefield Park for a *Galloway Steer*, and the reserve number for another Galloway; the **Sheep Championship** to the Findlaters, Jerviswood Mains, for a *Cheviot*, the Duke of Portland being second with a Suffolk-Southdown Cross; the **Pig Championship** to Julius Fricker, Dorset, for a *Berkshire*, and A. H. Palmer was second, also with a Berkshire.

L 1

Refer to page 324 *and* Plate LXXI.

TWICE 2000-GALLON YIELDS.

Particulars given by the Secretary of the British Friesian Cattle Society of lactations in successive years of British Friesian cows: E. B. Hall's "Blackmore Dinah," calved 24th December 1920, 2012 gallons in 327 days; calved on 7th March 1922, 2039 gallons in 281 days (due to calve again in May); Britain's Champion milk cow, Hache herd's "Brookside Colantha," calved 27th July 1920, 2368 gallons in 365 days; calved on 18th November 1921, 3155 gallons in 365 days. H. W. Daking's "Fairlight Roschen," calved 21st December 1920, 2155 gallons in 365 days; calved on 6th February 1922, 2007 gallons in 277 days. Gilbert & Woodfield's "Fillongley Abbots Queen," calved 22nd February 1921, 2065 gallons in 330 days; calved on 8th March 1922, 2058 gallons in 285 days—the first cow in this country to produce 2000 lb. of butter in two years. Sir Charles Markham's "Hedges Moss Rose," calved on 7th January 1919, 2083 gallons in 285 days; calved 10th December, 2001 gallons in 324 days; calving again in less than a year. J. P. Fletcher's "Osmaston Jenny," calved 26th October 1920, 2427 gallons in 365 days; calved January 1922, 2084 gallons in 291 days. The Earl of Leitrim's "Sparrowycke Darkeye," calved 2nd January 1920, 2061 gallons in 288 days; calved 26th February 1921, 2179 gallons in 365 days. G. T. Eton's aged cow, "Leerock Folly," calved 20th December 1920, 2050 gallons in 365 days; calved 28th March 1922, and has since exceeded the 2000-gallon yield. H. A. Ward's "Crawley Violet," calved 15th

November 1920, 2088 gallons in 352 days; calved 11th February 1922, since when she has made her second 2000-gallon record. In all, nine cows have so far given over 2000 gallons twice, and always in successive lactation periods.

There are now 73 British cows with 2000-gallon records, and 69 of them are British Friesians (30th December 1922).

M1

Refer to page 474.

DROPPED HIP IN RACE-HORSES.

The Duke of Portland—writing to the *Times* 27th December 1922 on the case of "The sale of a yearling for £10,000," successfully defended by Lady Sykes of the Sledmere Stud against "Jimmy White," as the Judge said, "because the slipped hip on the colt was plainly visible"—gave his experience as follows:—"To the best of my memory and belief, my mare 'Mrs Butterwick,' by 'St Simon' out of 'Miss Middlewick,' suffered badly from hip-down during the whole of her racing career. This notwithstanding, she won six races of the total value of £8179, including The Oaks of 1893. When she went to the stud she was a fairly successful brood-mare, breeding amongst others, 'Greatorex,' 'Phaleron,' and 'Abbazia,' the dam of 'Tetrabbazia.'"

N1

Refer to page 675.

THE CHICAGO INTERNATIONAL FAT STOCK SHOW.

Supreme Champion a Shorthorn Calf.—One of the judges was John M. Strickland of Brandsby, Bainesse, Catterick, the Yorkshire breeder of Shorthorns. The Grand Champion over all breeds was a pure-bred Shorthorn, and the Reserve a pure-bred Hereford. This is the third time in the history of the Exposition that a Shorthorn came out on top, the other occasions being in 1917 and 1907. The Supreme Champion (1922) was the first prize senior Shorthorn calf, "Chenoweth Jock," bred and shown by Messrs W. J. & B. A. Thomas, Shelbyville, Kentucky, and got by "Harviestoun Grandee," an outstanding animal, bred by J. Ernest Kerr of Harviestoun Castle, Dollar. "He is a rotund bullock, uniformly wide, and without discount in rounds and hind-quarter. His is well-nigh the last word in conditioning, and he carries his superlative finish as smooth as a bubble. Quality fairly exudes from every pore, and, withal, he is most appealing in breed character."—*The Breeders' Gazette*, 7th December.

O1

Refer to Page 210.

CATTLE IMPORTED FROM IRELAND IN 1922.

Into England and Wales, 687,730; and Scotland, 290,525.

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